



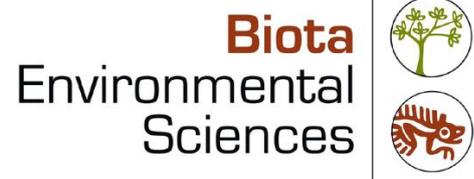
# Goomig Project Gouldian Finch Monitoring - Foraging Activity and Grass Phenology 2021-2022



Prepared for DPIRD

July 2022





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Project No.: 1635

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Document Quality Checking History

Version:	Rev A	Peer review:	M. Maier
	Rev A	Director review:	G. Humphreys
	Rev A	Format review:	M. Maier

Approved for issue: G. Humphreys

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# Goomig Gouldian Finch Monitoring – Foraging

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## Contents

<b>1.0</b>	<b>Executive Summary</b>	<b>9</b>
<b>2.0</b>	<b>Introduction</b>	<b>11</b>
2.1	Project Background	11
2.2	Project Scope	11
2.3	Gouldian Finch ( <i>Chloebia gouldii</i> )	13
2.4	Gouldian Finches in the Study Area	14
<b>3.0</b>	<b>Methods</b>	<b>17</b>
3.1	Survey Team and Timing	17
3.2	Weather and Seasonal Conditions	17
3.3	Gouldian Finch Foraging Surveys	20
3.4	Grass Monitoring	22
3.5	Limitations	26
<b>4.0</b>	<b>Results</b>	<b>27</b>
4.1	Gouldian Finch Foraging Surveys	27
4.2	Grass Cover and Phenology	33
<b>5.0</b>	<b>Discussion</b>	<b>41</b>
<b>6.0</b>	<b>Conclusions and Recommendations</b>	<b>43</b>
<b>7.0</b>	<b>References</b>	<b>45</b>

### Appendix 1

Location of 2-ha Survey Plots

### Appendix 2

Location and Orientation of Feeding Grass Transects

### Appendix 3

Bird Survey Data

### Appendix 4

Grass Transect Monitoring Data

### Appendix 5

Grass Phenology Data

### Appendix 6

Grass Monitoring Transect Photos

## Tables

Table 3.1:	Survey team and experience.	17
Table 3.2:	Survey timing and personnel.	17
Table 3.3:	Weather conditions during surveys.	18
Table 4.1:	Gouldian Finch records from the study area for the 2021-22 season.	28
Table 4.2:	Masked and Long-tailed Finch records from the study area for the 2021-22 season.	30
Table 4.3:	Grass cover in the study area in 2021-22.	33
Table 4.4:	Comparison of December <sup>1</sup> grass coverage (percentage total cover) between years.	33
Table 4.5:	Comparison of grass coverage (percentage total cover) between Gouldian Finch breeding areas and non-breeding habitat.	33
Table 4.6:	Grass phenology in the study area 2021-22.	34
Table 4.7:	Comparison of grass phenology in March 2022 between Gouldian Finch breeding and non-breeding areas.	34
Table 4.8:	Comparison of percentage of grasses flowering in March (Feb-April <sup>1</sup> ) between years.	35
Table 4.9:	Comparison of percentage of grasses seeding in March (Feb-April <sup>1</sup> ) between years.	35
Table 4.10:	Evidence of fire at the 41 grass study plots for the 2021-22 season.	35
Table 4.11:	Evidence of cattle at the 41 grass study plots for the 2021-22 season.	38
Table 4.12:	Comparison of percentage cattle evidence from 2021-22 with previous seasons.	38

## Figures

Figure 2.1:	Goomig Project buffer area (the study area).	12
Figure 2.2:	Individuals recorded during previous breeding season surveys, standardised for survey effort.	14
Figure 2.3:	Individuals recorded during previous non-breeding season surveys, standardised for survey effort.	15
Figure 3.1:	Rainfall and temperature data for the previous year compared to long-term averages.	19
Figure 3.2:	Location of two hectare foraging survey plots.	21
Figure 3.3:	Schematic representation of grass monitoring site.	22
Figure 3.4:	Location of grass monitoring sites.	23
Figure 3.5:	Schematic representation of 50 m grass monitoring transect and 1 m x 1 m phenology quadrats (adapted from Jackett 2021 a).	25
Figure 4.1:	Number of Gouldian Finch recorded foraging in the study area during systematic surveys (standardised for survey effort).	27
Figure 4.2:	Gouldian Finch records from the study area during 2021-22 season	29
Figure 4.3:	Location of other finch species records from study area in December 2021.	31
Figure 4.4:	Location of other finch species records from study area in March 2022.	32
Figure 4.5:	Evidence of fire at vegetation plots – December 2021.	36
Figure 4.6:	Evidence of fire at vegetation plots – March 2022.	37

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Figure 4.7: Evidence of cattle activity at vegetation plots – December 2021.	39
Figure 4.8: Evidence of cattle activity at vegetation plots – March 2022.	40
<b>Plates</b>	
Plate 4.1: Gouldian Finches in the study area on 19 <sup>th</sup> May 2022, part of a larger flock of 25 birds.	27
Plate 4.2: Gouldian Finches in the study area on 12 <sup>th</sup> April 2022.	28

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# 1.0 Executive Summary

The Goomig Project (Weaber Plains Development Project) is an irrigated agricultural development located approximately 30 km north of Kununurra, which involves clearing of approximately 9,260 ha of vegetation for agriculture. Approximately 11,470 ha of native vegetation surrounding, or remaining between, the cleared areas is designated as a buffer area (the study area) to be managed to protect surrounding conservation reserves and watercourses (Strategen 2014).

Monitoring of Gouldian Finch wet season foraging activity and phenology and productivity of grasses important for foraging in the buffer area during ongoing operation are required as conditions of the approval for the project, and is outlined in the Gouldian Finch Conservation Plan (GFCP; Strategen 2014). Item 8 of the monitoring regime requires “annual wet-season monitoring of foraging activity in critical wet-season feeding areas in close proximity to breeding areas, to be undertaken between November and April each year”, and Item 9 requires “mapping and annual monitoring of the phenology and productivity of wet season feeding habitat, and assessment of their use by Gouldian Finches, to be undertaken between November and April each year”.

Wet season foraging and grass monitoring in the buffer area were conducted across two phases in December 2021 and March 2022. Foraging activity was systematically monitored by undertaking 20 minute, two hectare surveys at 58 locations within the study area, with any opportunistic observations made outside of the systematic surveys also recorded. Grass phenology and productivity was monitored at 41 previously-determined monitoring locations within the study area, consistent with past monitoring.

No Gouldian Finches were recorded in the study area during the systematic foraging surveys in December and March, nor were any observed opportunistically during these months. There were opportunistic observations of small numbers (up to 3 individuals on 4 occasions) in the north of the study area in April, and of small flocks (15 and 25 individuals) in the north and centre of the study area in May. These numbers were higher than those recorded during the 2020-21 monitoring season, when only two single individuals were recorded. However, surveys during 2020-21 were undertaken only in October and March, and no Gouldian Finches were recorded during the December and March surveys in 2021-22. Hence, foraging activity in the study area during the wet season still appears to be very low.

It is likely that the lack of foraging activity in the later part of the wet season is related to the decline in breeding activity. The reasons for their absence earlier in the wet season prior to breeding are less apparent, though it is possible that birds are already moving to areas in proximity to their breeding areas by this time. The presence of larger groups of Gouldian Finches in May indicates that suitable foraging habitat still exists within the study area, at least at certain times of year. Their occurrence in flocks including juveniles also suggests that these birds had dispersed into the study area from other local breeding areas after completion of breeding.

No Gouldian Finches were observed directly eating seeds of any specific grasses during the opportunistic observations in April and May. Most foraging activity was observed taking place on the ground, so it is likely that birds were feeding on fallen seed. As observations were made primarily amongst sorghum (*Sarga/Sorghum* spp.) and spinifex (*Triodia* spp.), it is likely that seeds of these grasses were the primary food source. This is consistent with previous observations in the study area, which have almost exclusively involved birds feeding primarily on sorghum and spinifex seeds, or on fallen seed amongst sorghum and spinifex.

Total coverage of foraging grasses was lower than in previous seasons based on December data, though sorghum and spinifex remained the dominant grasses by cover. It is likely that this is primarily due to the fires that impacted the study area in June-July and November-December, as grasses on the transects affected had not yet regenerated from either fire by the December survey. The other notable difference in grass cover was a significant increase in the extent of *Themeda triandra* this season compared to previous seasons. No clear reason for this increase

was evident, though the extent of *T. triandra* in the October survey in 2020 was also notably higher than any previous October surveys, which suggests this is part of an increasing trend rather than a major increase in this season only.

Flowering and seeding rates recorded this season in March 2022 were lower overall compared to the rates recorded at similar times in past seasons, though data are lacking for the three most recent seasons. This was most notable in the case of spinifex, with almost no plants recorded flowering or seeding this season, compared to previous years. The two fires that impacted the study area during 2021 affected most of the *Triodia*-dominated transects, which is likely the reason for the low rates of flowering and seeding observed. Conversely, most of the sorghum (*Sarga/Sorghum* spp.) in these areas were seeding in March, while those in non-breeding habitats not affected by the fires were mostly not seeding. It is likely that as most sorghum grasses in the area are annual species, they responded more quickly following the fire than the perennial *Triodia* species; while sorghum in unburnt areas may have seeded earlier as a result of establishing earlier, or later due to increased competition with other perennial grasses and other plants.

The results of the monitoring during the 2022 season indicate that the target (identified in the GFCP) of “no reduction in baseline<sup>1</sup> [wet season] foraging activity which can be attributed to Buffer Area management” has not been met, as no Gouldian Finches were recorded during systematic foraging surveys in the wet season, and only a small number (3-7) were observed opportunistically in the late dry season. However, the study area was still used for foraging during the dry season.

It is not possible to clearly determine whether the target for grass productivity and phenology (identified in the GFCP) of “no reduction in baseline<sup>1</sup> phenology and productivity which can be attributed to Buffer Area management” is being met this season due to the impacts of two fires that affected the study area in 2021, as changes in grass coverage and phenology observed this season are likely to be short-term effects of the fires. The results of monitoring in the 2022-23 season should help better determine whether this target is still being met.

We make the following recommendations regarding ongoing monitoring and management based on the results of monitoring in the 2021-22 season:

1. Repair or replace broken or missing nest boxes in accordance with recommendations outlined in the breeding report (Biota 2022).
2. Continue the ongoing removal of cattle from the buffer area (study area) in accordance with the buffer management plan (Strategen 2012).
- 3a. Expand or revise the monitoring program to encompass foraging locations outside of the buffer area to provide control data; OR
- 3b. Incorporate relevant data obtained by other monitoring programs at suitable control sites in the region into the assessment and reporting each year.

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<sup>1</sup> Baseline data have not been defined explicitly in the GFCP – we have treated 2014 breeding season foraging counts and the 2015 grass monitoring data as the baseline for this purpose, as these are the earliest data available to us, though data from prior to clearing commencing would be preferable.

## 2.0 Introduction

### 2.1 Project Background

The Goomig Project (formerly Weaber Plains Development Project) is an irrigated agricultural development located approximately 30 km north of Kununurra (Figure 2.1) and is an expansion of the existing stage 1 of the Ord River Irrigation Scheme. The project was approved by the then Department of Sustainability, Environment, Water, Population and Communities in 2011.

The project involves clearing approximately 9,260 ha of vegetation for agriculture. Approximately 11,470 ha of native vegetation surrounding, or remaining between, the cleared areas has been designated as a buffer area (the study area) to be managed to protect surrounding conservation reserves and watercourses (Strategen 2014).

### 2.2 Project Scope

Gouldian Finch monitoring in the buffer area of the Goomig Project during ongoing operation is required as a condition of approval for the project. A Gouldian Finch Conservation Plan (GFCP) has been prepared which includes a monitoring regime to be implemented to satisfy this condition (Strategen 2014). Biota Environmental Sciences (Biota) was engaged by the Department of Primary Industries and Regional Development (DPIRD) to implement this monitoring during the 2021-22 season.

The scope of the current study was to undertake monitoring surveys to meet the requirements of Items 7, 8 and 9 in Table 3 of the GFCP for the 2021-22 season:

- Item 7: Annual monitoring of breeding populations, including timing and reproductive outputs (i.e. clutch size and fledging success), to be undertaken annually between February and July;
- Item 8: Annual wet-season monitoring of foraging activity in critical wet-season feeding areas in close proximity to breeding areas, to be undertaken between November and April each year; and
- Item 9: Mapping and annual monitoring of the phenology and productivity of wet season feeding habitat, and assessment of their use by Gouldian Finches, to be undertaken between November and April each year.

This report addresses the results of the wet-season foraging activity and grass phenology monitoring (Item 8 and Item 9). Item 7 is addressed in a separate report.

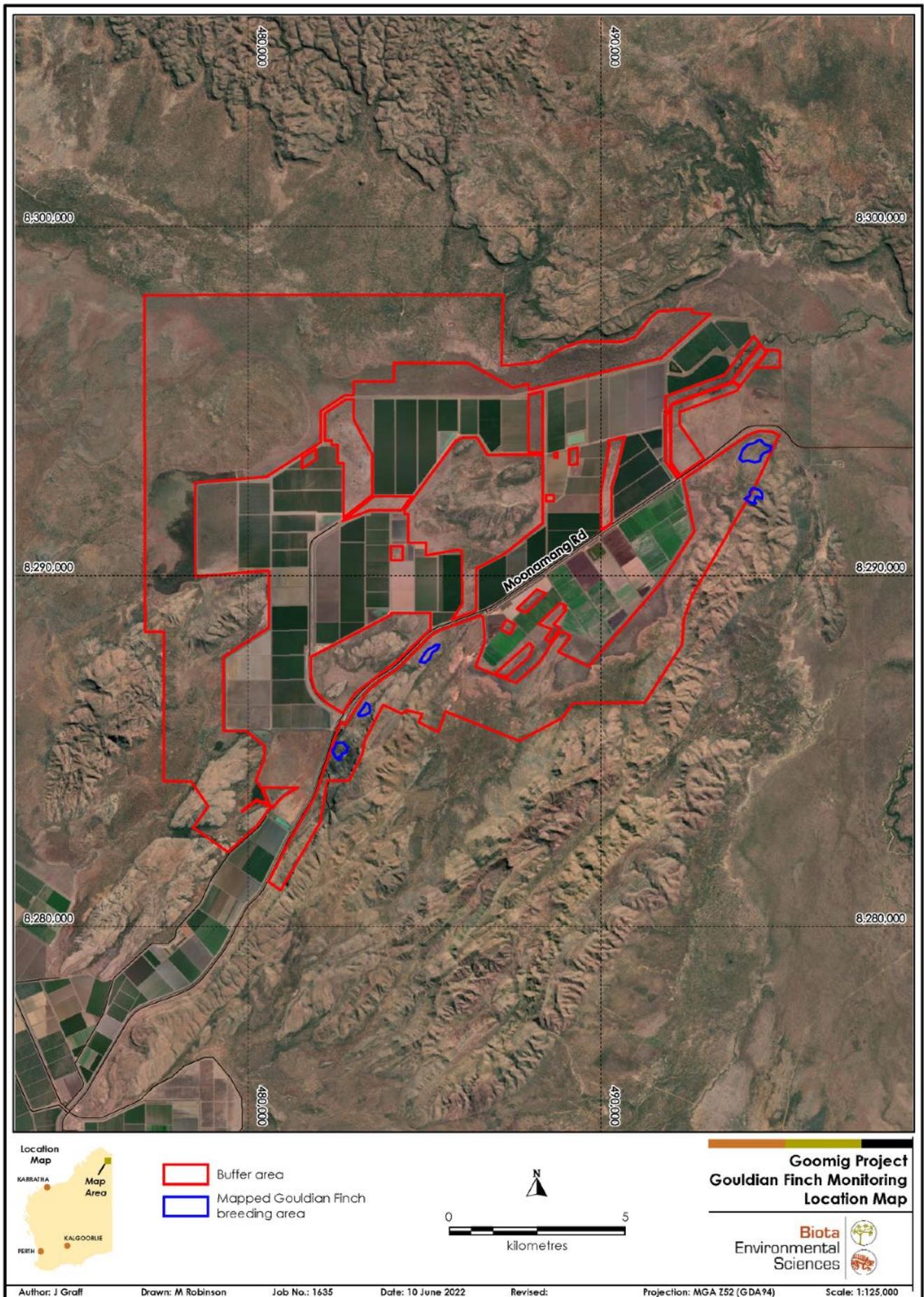


Figure 2.1: Goomig Project buffer area (the study area).

## 2.3 Gouldian Finch (*Chloebia gouldii*)

### 2.3.1 Distribution

The Gouldian Finch formerly occurred across large areas of tropical northern Australia, from Cape York in Queensland to the Kimberley region of Western Australia. However, over the last 100 years, the species has declined markedly in range and abundance, and is now recorded reliably only from the Northern Territory and Western Australia, with infrequent records in Queensland (O'Malley 2006).

In Western Australia, the Gouldian Finch occurs throughout much of the Kimberley region in the north-east of the state, from the Dampier Peninsula in the west, south to Mornington Wildlife Sanctuary and Halls Creek, and east to Lake Argyle and the WA border (Johnstone and Storr 2004, Cornell Lab of Ornithology 2022).

### 2.3.2 Habitat

Known breeding habitat for Gouldian Finches primarily comprises rocky hillslopes with smooth-barked eucalypts, including *Eucalyptus brevifolia*, *E. tinnitans* (O'Malley 2006), *E. miniata*, and *Corymbia dichromophloia* (Brazill-Boast et al. 2011), located in proximity (usually <2 km) to permanent fresh water sources for drinking (O'Malley 2006). An understorey of suitable foraging grasses is also typically an important component of breeding habitat (Brazill-Boast et al. 2011).

During the non-breeding season, Gouldian Finches disperse from breeding areas into adjacent lowland areas, favouring woodland areas with an understorey of suitable foraging grasses (Dostine et al. 2001).

### 2.3.3 Breeding Ecology

Gouldian Finches nest almost exclusively in eucalypt hollows, though there are historical reports of nesting in termite mounds (Tidemann 1996). In the east Kimberley, they nest in hollows in the cavity-bearing eucalypts *Corymbia dichromophloia* and *Eucalyptus miniata* (Brazill-Boast et al. 2010, 2011). Selection of hollows is highly dependent on structural characteristics of the hollow and the number of suitable hollows available in an area (Brazill-Boast et al. 2010, 2011).

Eggs are laid between February and June near Wyndham in Western Australia (Brazill-Boast et al. 2010), and between January and August, depending on wet season rainfall, on Newry Station in the Northern Territory (Tidemann et al. 1999). The average clutch size at Northern Territory study sites was  $5.2 \pm 1.3$ , and pairs were recorded laying up to three clutches per season (Tidemann et al. 1999).

### 2.3.4 Diet

The Gouldian Finch is an obligate granivore, feeding almost entirely on grass seeds, though insects are occasionally taken (Johnstone and Storr 2004). Research in the Northern Territory found Gouldian Finches foraged mostly on the ground in burnt areas during the dry season, feeding on fallen seed from annual grasses, particularly sorghum (*Sarga*) species, which was exposed by the burning of the grass cover (Dostine et al. 2001). During the wet season, the finches fed on seeds of perennial grasses, including *Themeda triandra*, *Alloteropsis semialata*, *Chrysopogon fallax*, and *Heteropogon triticeus*, taking seeds directly off the grasses as they ripen (Dostine et al. 2001).

### 2.3.5 Conservation and Threatening Processes

The Gouldian Finch is listed as Endangered at federal level under the *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act). It is not listed as threatened under state legislation in Western Australia, but is listed as a Priority 4 species by the Department of Biodiversity, Conservation and Attractions (DBCAs). Outside of Western Australia, the Gouldian Finch is also

listed as Endangered under the *Nature Conservation Act 1992* in Queensland, and as Vulnerable in the Northern Territory under the *Territory Parks and Wildlife Conservation Act 2000*.

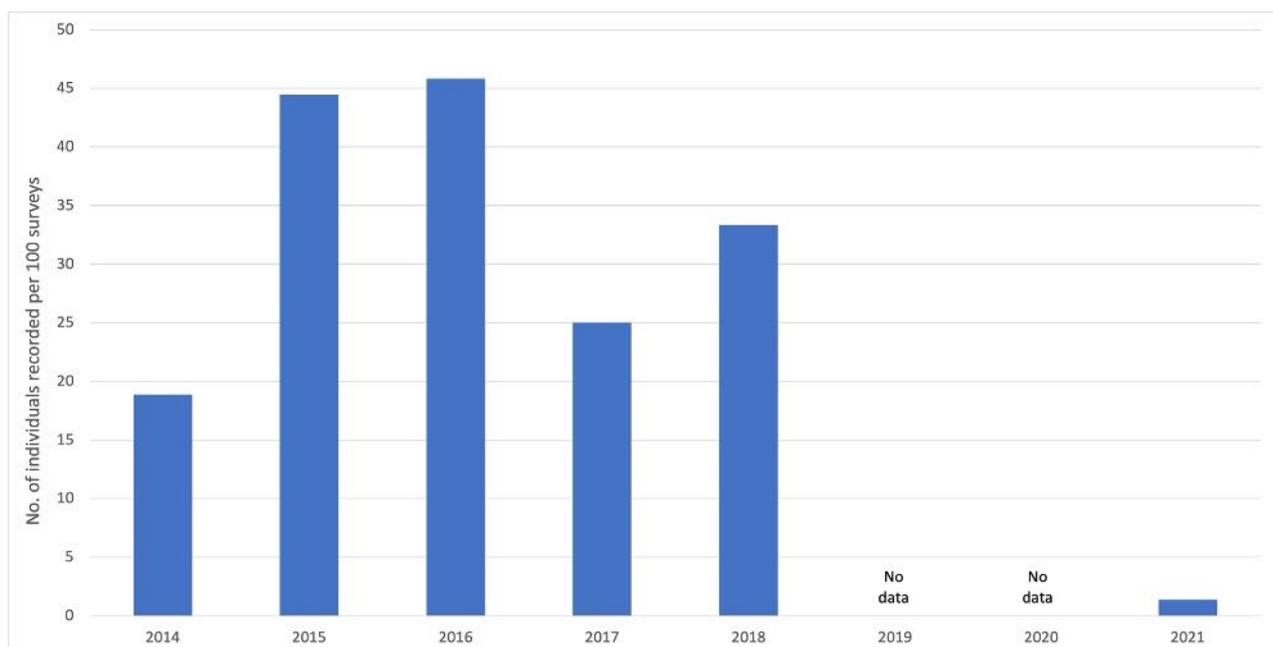
The current key threatening processes for Gouldian Finches are considered to be changes in vegetation due to altered fire regimes and grazing by introduced animals (O'Malley 2006, Legge et al. 2015). More regular, intense fires were found to be related to poorer body condition in Gouldian Finches from the late dry season to late wet season (Legge et al. 2015). This is likely because they reduce food availability by burning the annual grass seeds used for dry season foraging, damaging the perennial grasses used for wet season foraging, and reducing the spatial and temporal complexity in seed availability relied on to provide year-round food resources (Watkinson et al. 1989, Crowley and Garnett 2001, Legge et al. 2015). Regular intense fires have also been found to reduce nest hollow availability (Brazill-Boast et al. 2010, 2011). Heavy grazing is also likely to reduce food availability for Gouldian Finches, by decreasing seed yields and extent of key Gouldian Finch foraging grasses (Crowley and Garnett 2001)

Commercial trapping of wild finches also coincided with major declines in Gouldian Finch populations in the Kimberley until it ended in 1986 (Franklin et al. 1999). High levels of infestation by mites in the air sacs of wild Gouldian Finches have also been reported, and have been suggested as a possible cause of population declines, but the actual extent of the impact is uncertain (O'Malley 2006).

## 2.4 Gouldian Finches in the Study Area

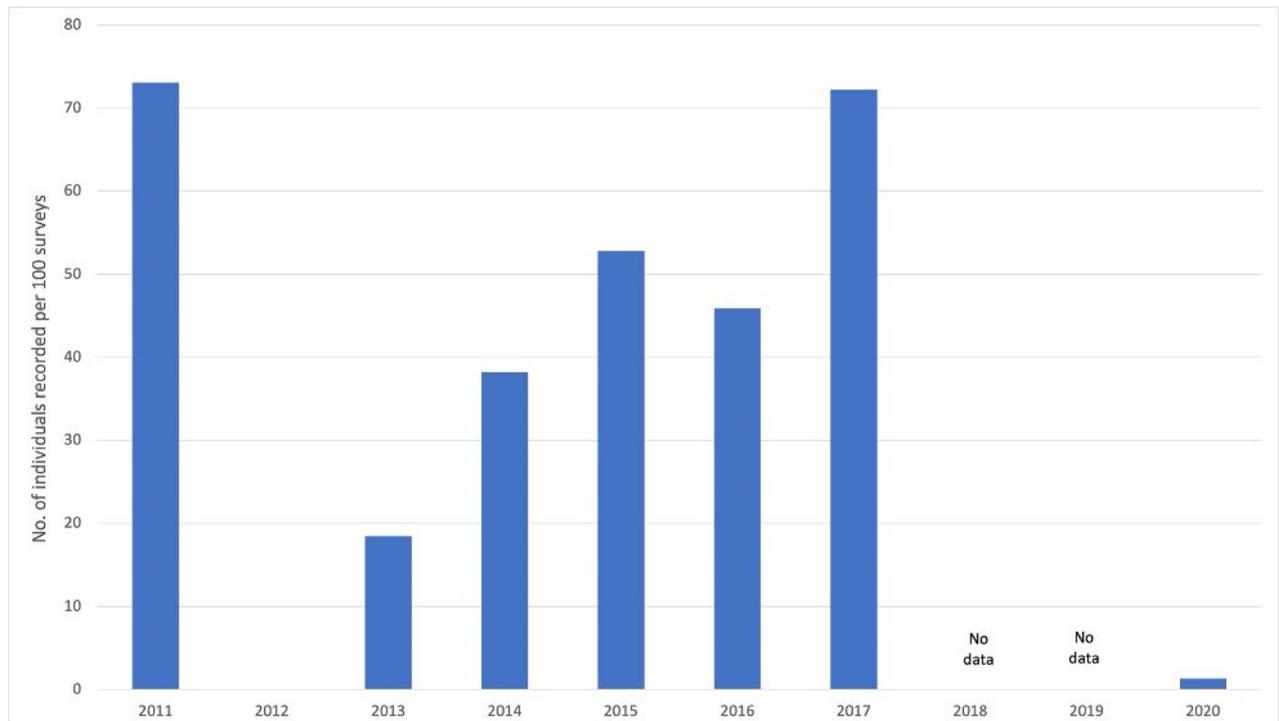
### 2.4.1 Foraging

Suitable foraging habitat for Gouldian Finches exists within the Goomig Project buffer area. Gouldian Finches were recorded foraging in the buffer area during the breeding season each season from 2014 to 2018; the number of individuals ranged from 17 to 32, with all records from within the mapped breeding areas (Save The Gouldian Fund 2014a, 2015a, 2016a, 2017a, 2018a). Survey effort varied somewhat between seasons, but the general trend remains the same when this is accounted for (Figure 2.2). The majority of these records were from breeding areas where active nests were also recorded, with the exception of the 2018 season when a single individual was seen in a breeding area where no nests were detected (Save The Gouldian Fund 2018a). During the 2021 survey, a single adult male was recorded, also from within a mapped breeding area, though no active nests were recorded that season (Jackett 2021a).



**Figure 2.2:** Individuals recorded during previous breeding season surveys, standardised for survey effort.

Gouldian Finches have also been observed using the Goomig Project buffer area during the non-breeding season. Individuals were recorded by Animal Plant Mineral (APM) during general bird surveys in the project area in August 2010 (Save The Gouldian Fund 2015b), and 73 individuals were subsequently recorded during targeted surveys in 2011 (Save The Gouldian Fund 2011a). No Gouldian Finches were sighted in the development envelope or buffer areas during the initial land-clearing phase in 2012 (Save The Gouldian Fund 2012a). However, following completion of clearing, Gouldian Finches were again recorded in the buffer area, and the number of individuals recorded trended upwards with 14 individuals sighted in 2013, 29 in 2014, 38 in 2015, 33 in 2016, and a high count of 52 in 2017 (Save The Gouldian Fund 2013a, 2014b, 2015b, 2016b, 2017b). This count was still lower than the pre-clearing count of 73 individuals, including 65 individuals in the study area, but is approximately equivalent when standardised for survey effort (Figure 2.3). No counts were undertaken during the 2018-19 and 2019-20 non-breeding seasons, and only a single juvenile individual was recorded during the October 2020 survey (Jackett 2021b).



**Figure 2.3:** Individuals recorded during previous non-breeding season surveys, standardised for survey effort.

## 2.4.2 Breeding

Suitable breeding habitat for Gouldian Finches within the Goomig Project buffer area was identified in 2010, with 11 areas of suitable habitat identified (Pryke 2010). Gouldian Finches were recorded breeding in five of these areas during a detailed survey in 2011 (see Figure 2.1), with 43 active nests recorded that season in natural hollows (Save The Gouldian Fund 2011b). The number of active nests recorded declined in subsequent years, to 29 in 2012 and 12 in 2013 (Save The Gouldian Fund 2012b, 2013b).

Following the 2013 breeding season, 120 artificial nest boxes were erected in the five known breeding areas to provide additional suitable nesting sites (Save The Gouldian Fund 2014a). The following breeding season (2014), nine active nests were recorded in the study area, all using the newly-installed artificial nest boxes (Save The Gouldian Fund 2014a). The number of active nests recorded increased again in subsequent years, to 26 in 2015, 32 in 2016, and 43 in 2017, before declining again to 23 in 2018 (Save The Gouldian Fund 2015a, 2016a, 2017a, 2018a). All active nests recorded since the installation of artificial nesting boxes have been recorded from these nest boxes, with none recorded from natural hollows, despite searches of all previously identified potentially suitable natural hollows.

No monitoring was undertaken during the 2019 and 2020 breeding seasons, and no active nests were located during the 2021 breeding season, albeit from only a single phase of survey undertaken in March (Jackett 2021a). The 2021 survey also identified that a large proportion (79%) of the artificial nest boxes were missing or damaged, and recommended repairing or installing new nest boxes (Jackett 2021a). As a result, additional nest boxes were erected in the northern section of the buffer area in 2021.

## 3.0 Methods

### 3.1 Survey Team and Timing

The wet season foraging activity and grass cover and phenology monitoring were undertaken in December 2021 and March 2022, with additional opportunistic observations of Gouldian Finches recorded during nest box monitoring trips in April and May 2022.

Survey personnel and qualifications are outlined in Table 3.1, with timing and scope of surveys outlined in Table 3.2.

**Table 3.1: Survey team and experience.**

Personnel	Position	Qualifications	Years of Experience	Project Role
Garth Humphreys	Principal Ecologist/Director	BSc (Hons)	32	Project Director
John Graff	Zoologist	BSc (Hons)	15	Project Manager, field survey, data analysis and reporting
Nathan Beerkens	Zoologist	BSc (Hons)	6	Field survey, data analysis and reporting
Joshua Keen	Zoologist	BSc (Hons)	7	Field survey
Nigel Jackett	Senior Zoologist (contractor)	BSc (Hons)	16	Field survey
Louis Masarei	Zoologist (contractor)	BSc	6	Field survey

**Table 3.2: Survey timing and personnel.**

Survey Dates <sup>1</sup>	Team Members	Activities
3 <sup>rd</sup> – 9 <sup>th</sup> December 2021	John Graff, Nathan Beerkens	Foraging activity surveys Grass phenology monitoring
12 <sup>th</sup> – 20 <sup>th</sup> March 2022	Nathan Beerkens, Joshua Keen	Foraging activity surveys Grass phenology monitoring Nest box monitoring
12 <sup>th</sup> – 14 <sup>th</sup> April 2022	John Graff, Nigel Jackett	Nest box monitoring
17 <sup>th</sup> – 19 <sup>th</sup> May 2022	John Graff, Louis Masarei	Nest box monitoring

<sup>1</sup> Excludes travel-only days.

### 3.2 Weather and Seasonal Conditions

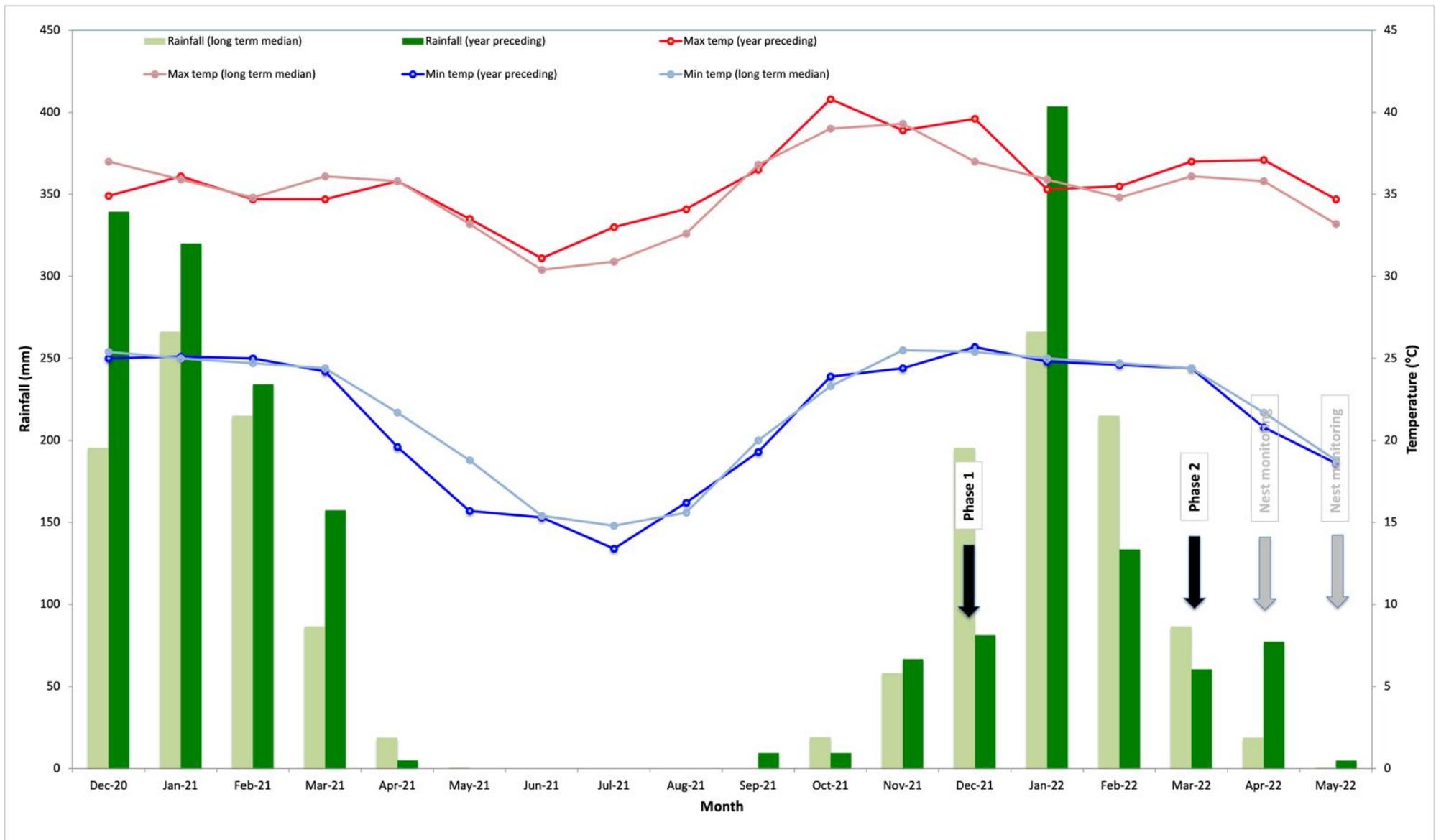
Weather conditions during both main survey phases were typical for the wet season in the region, with hot, relatively humid conditions and patchy, sometimes heavy rainfall associated with thunderstorms (Table 3.3).

Seasonal conditions for the 2021-22 wet season were fairly consistent with long term averages (Figure 3.1). However, rainfall was slightly below average overall (846 mm compared to the long-term median of 860 mm), with extensive heavy rainfall not recorded until January 2022. Maximum temperatures over the preceding year were generally higher than the long-term average. The preceding 2020-21 wet season was wetter than average, with notably higher rainfall early in the season compared to the 2021-22 season (Figure 3.1).

**Table 3.3: Weather conditions during surveys.**

Temperature and rainfall data taken from DPIRD Kimberley Research Station weather station; wind data from Bureau of Meteorology Kununurra Aero weather station.

Survey	Date	Max Temp (°C)	Min Temp (°C)	Rainfall (mm)	Wind at 9am (km/h)	Wind at 3pm (km/h)
Phase 1 (Foraging surveys and grass transects)	3 <sup>rd</sup> Dec 2021	43.2	23.9	0.0	11 SE	17 NE
	4 <sup>th</sup> Dec 2021	42.2	27.6	0.0	7 NNE	7 S
	5 <sup>th</sup> Dec 2021	41.9	27.8	0.0	13 WNW	15 W
	6 <sup>th</sup> Dec 2021	36.5	22.8	40.4	15 NE	11 NE
	7 <sup>th</sup> Dec 2021	37.9	25.6	0.2	9 N	19 NNE
	8 <sup>th</sup> Dec 2021	38.0	24.4	4.0	13 SE	13 N
	9 <sup>th</sup> Dec 2021	36.7	23.6	0.2	9 SSW	9 SSW
Phase 2 (Foraging surveys, grass transects, nest box monitoring)	12 <sup>th</sup> Mar 2022	35.0	23.3	15.6	13 NW	9 NNE
	13 <sup>th</sup> Mar 2022	37.2	24.7	0.2	7 NNE	9 N
	14 <sup>th</sup> Mar 2022	36.2	22.0	1.2	11 WSW	9 N
	15 <sup>th</sup> Mar 2022	38.3	24.8	0.0	6 NW	4 NE
	16 <sup>th</sup> Mar 2022	37.9	25.1	0.0	9 NE	11 NNE
	17 <sup>th</sup> Mar 2022	36.2	25.0	0.0	11 N	11 NNW
	18 <sup>th</sup> Mar 2022	35.3	20.7	27.6	17 SE	11 ESE
	19 <sup>th</sup> Mar 2022	37.3	25.0	0.0	15 SE	13 SSE
	20 <sup>th</sup> Mar 2022	37.4	24.6	0.0	4 SE	15 N



**Figure 3.1: Rainfall and temperature data for the previous year compared to long-term averages.**

Rainfall data taken from DPIRD Kimberley Research Station weather station; temperature data from Bureau of Meteorology Kununurra Aero weather station.

### 3.3 Gouldian Finch Foraging Surveys

Gouldian Finch foraging activity was monitored by undertaking 20 minute, two hectare plot surveys in breeding and non-breeding buffer areas. A total of 58 plots were surveyed during each monitoring phase, including 25 plots within mapped Gouldian Finch breeding areas and 33 plots in the surrounding buffer areas (Figure 3.2). This methodology was chosen to retain consistency with previous Wet season monitoring, allowing comparable count data to be collected. Although count data is no longer specifically required by the GFCP, ongoing systematic count data is still useful for identifying presence and population trends in the study area. The Long-tailed Finch (*Poephila acuticauda*) and Masked Finch (*P. personata*) are the two finch species that most regularly co-occur with Gouldian Finches, so we also present systematic count data for those species following recommendations from the 2020-21 monitoring, as these data may provide context for observed changes in Gouldian Finch numbers (Jackett 2021a, 2021b).

It was initially planned to survey the same 72 two hectare plots surveyed for the breeding season counts in 2020-21 (Jackett 2021a). However, the number of plots and proximity of their centre points meant that it was not possible to establish these plots without overlapping adjacent plots, particularly within the identified breeding areas. As such, a reduced number of non-overlapping plots covering the same areas were surveyed.

Surveys were undertaken within the first four hours after sunrise, when bird activity was expected to be highest, with each survey plot surveyed by a single observer moving systematically through the plot for 20 minutes. All bird species observed within the plot area were recorded, along with a total count for each species. Birds located outside of the plot boundary were not recorded as part of the systematic survey. For observations of finch species made during the systematic surveys, the species, number of individuals, and a GPS location for the observation were recorded. Where Gouldian Finches were observed, the following additional information was also recorded where possible:

- Age class and sex;
- Activity (e.g. foraging, flyover, drinking, sitting in tree, carrying nesting material); and
- If foraging, the species of grass they were feeding on (recorded to at least genus-level wherever possible).

Incidental observations of finch species from the study area made outside of the systematic surveys were also recorded, along with the same information outlined above.

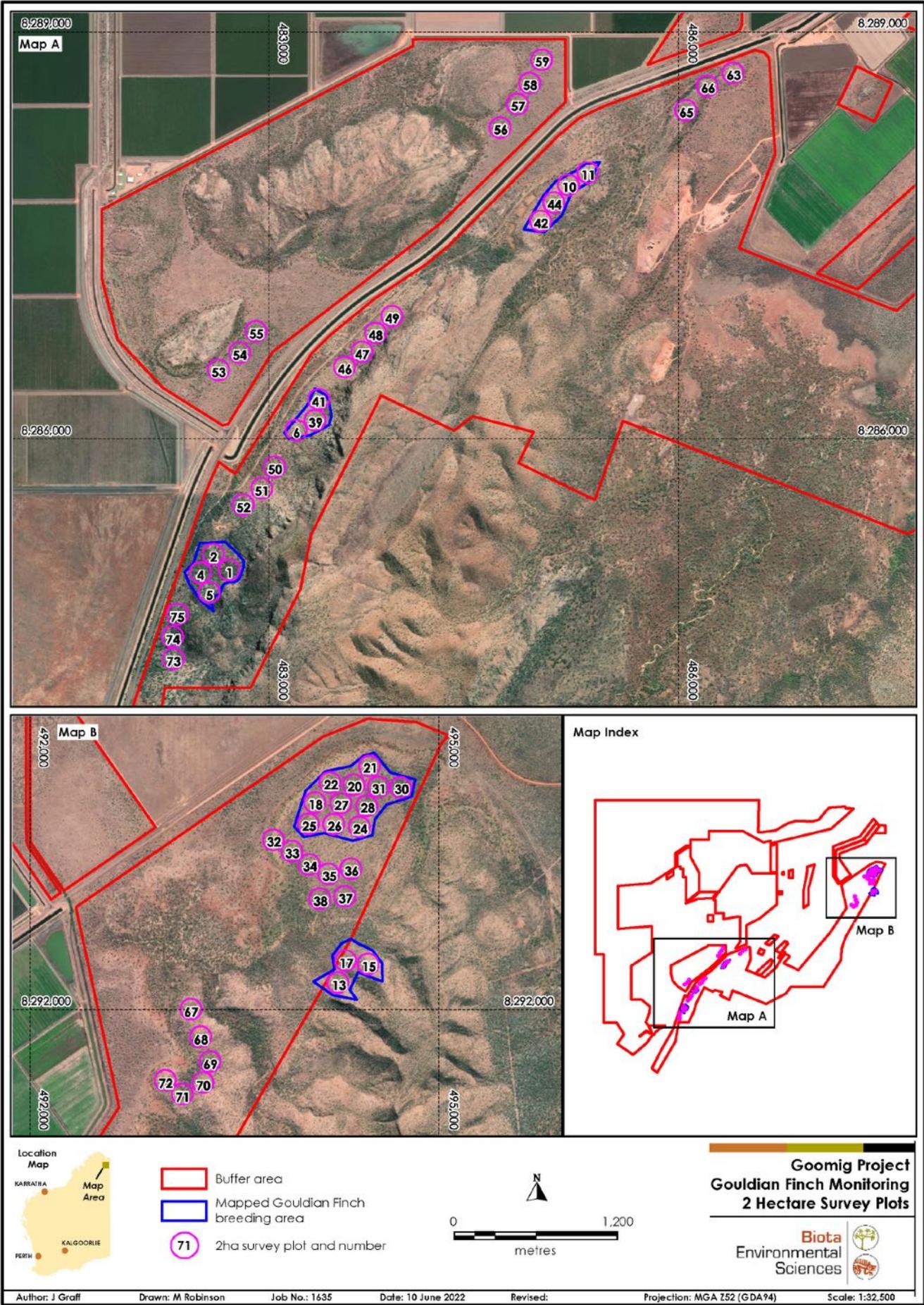


Figure 3.2: Location of two hectare foraging survey plots.

## 3.4 Grass Monitoring

Grass monitoring was undertaken by re-surveying 41 previously established monitoring sites, each including a 50 m transect, marked by aluminium pickets at each end, extending diagonally into a broader 50 m x 50 m quadrat (Figure 3.3). A total of 21 of these monitoring sites were located within the previously identified Gouldian Finch breeding areas and another 20 were within surrounding buffer areas (Figure 3.4; Appendix 3).

Grass monitoring focussed on those grass species identified as key food sources for Gouldian Finch by Dostine et al. (2001). Specifically, this includes the following species:

- Sorghum (*Sarga/Sorghum* spp.);
- Spinifex (*Triodia* spp.);
- Cockatoo Grass (*Alloteropsis semialata*);
- Golden Beard Grass (*Chrysopogon fallax*);
- Spear Grass (*Heteropogon* spp.);
- Native Millet (*Panicum decompositum*);
- White Grass (*Sehima nervosum*);
- Kangaroo Grass (*Themeda triandra*); and
- Rice Grass (*Xerochloa laniflora*).

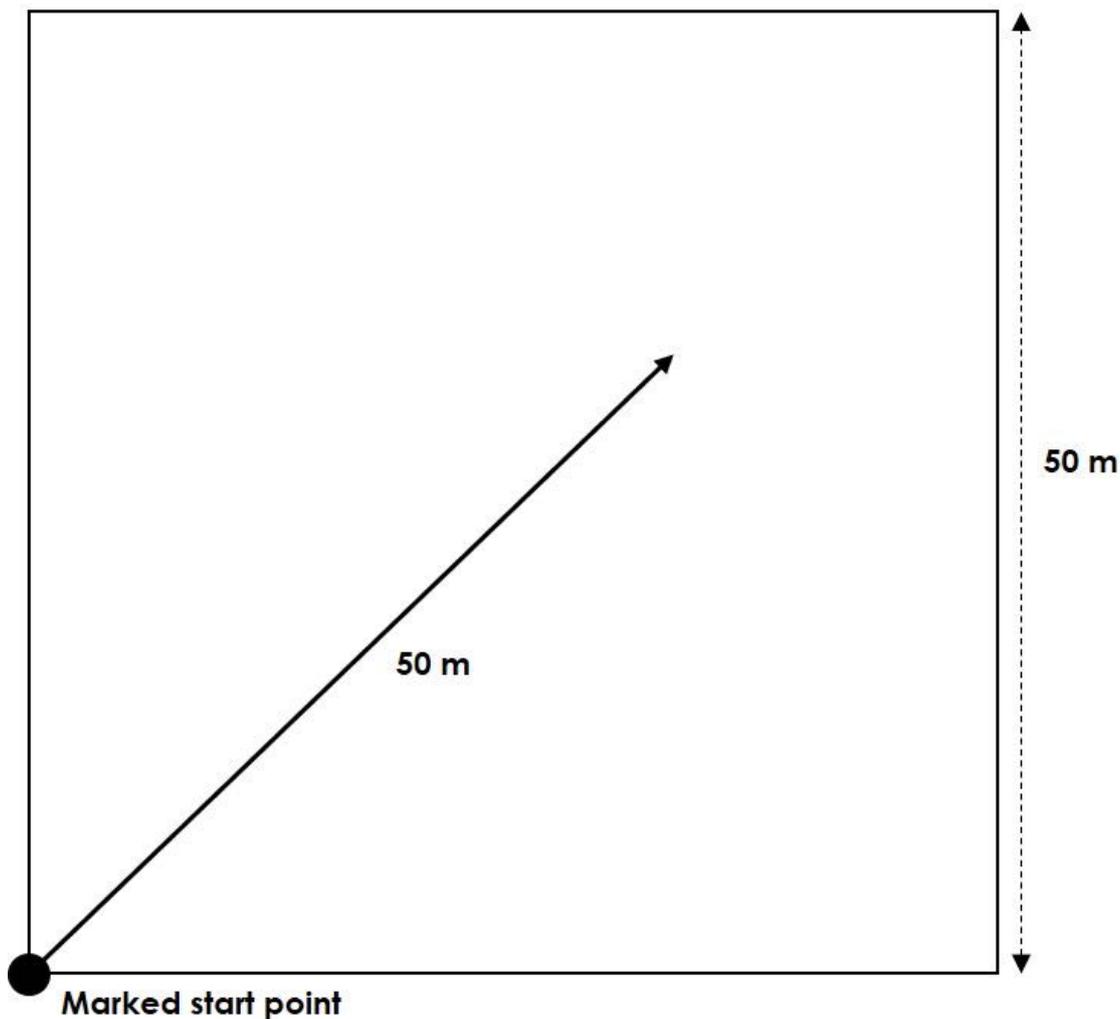


Figure 3.3: Schematic representation of grass monitoring site.

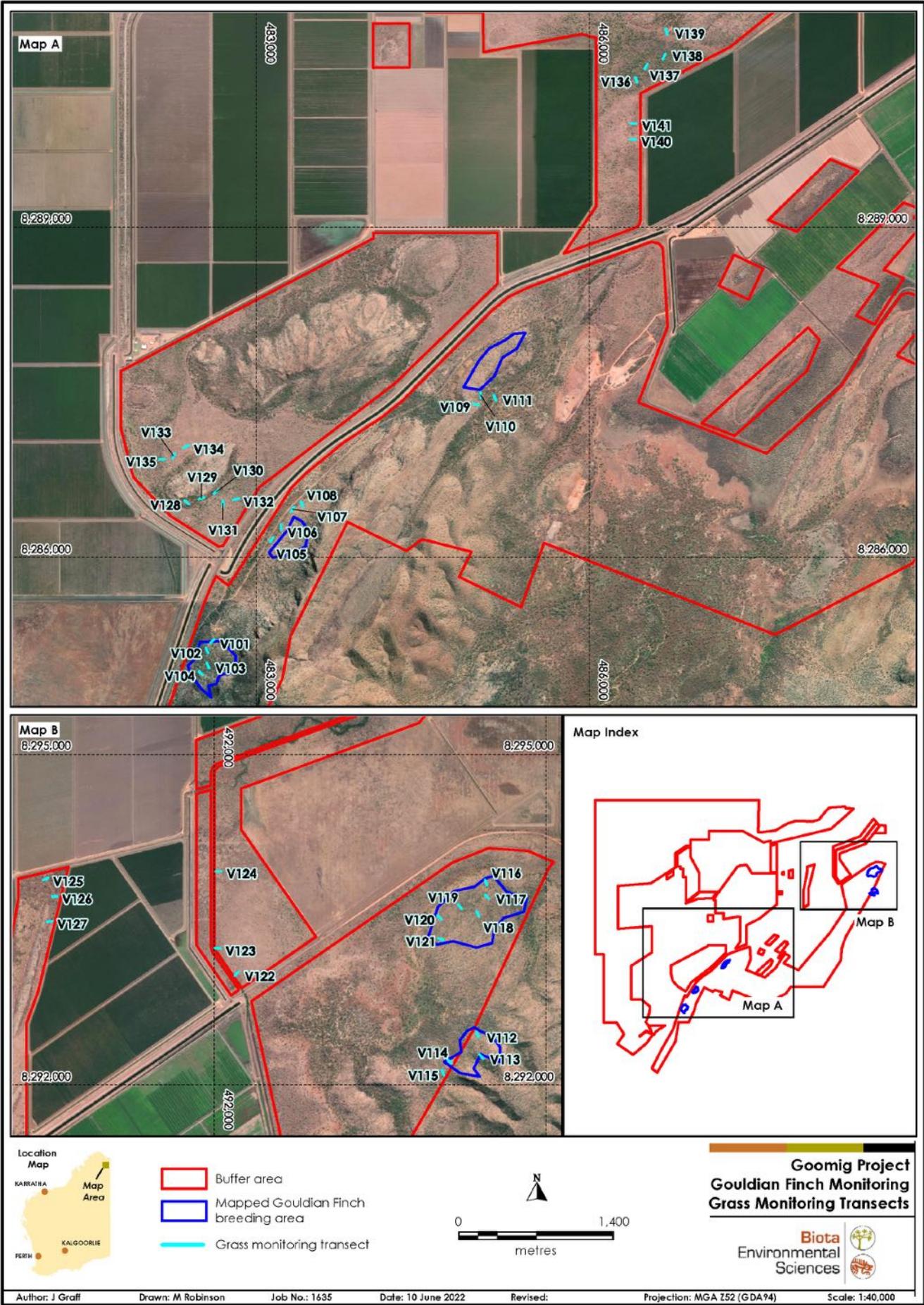


Figure 3.4: Location of grass monitoring sites.

### 3.4.1 Grass Coverage

A 50 m transect was marked between the established monitoring pickets, where these could be located; or using the provided GPS location and bearing, if the pickets could not be located. The original location of one monitoring site (V127) was in an area that has since been cleared based on the provided GPS location; this site was re-established in remaining bushland immediately adjacent to the original location. Where pickets were found in a different location to the provided GPS point, a new GPS location was recorded using a high-accuracy GPS tablet. The full updated list of transect locations is provided in Appendix 3.

Along each 50 m transect, the coverage of important foraging grass species was recorded by measuring (in centimetres) the extent of grass either above or below the tape. Measurements were taken for the first one metre in every five metres, giving a total of 10 sections of measurements, each of one metre, per transect (Figure 3.5). This approach followed that used during the previous monitoring season (Jackett 2021c). Earlier reports do not indicate that this approach was used in earlier monitoring seasons, however the methodology provided with the raw data from these monitoring phases states “10 measurements are recorded at 5 m intervals along the tape”.

The total coverage of foraging grasses was then calculated by totalling the measurements for each species along the tape, and the percentage cover for each species was also calculated. In addition, the proportion of the total extent of suitable foraging grasses was calculated, following the approach used to present results of previous monitoring (e.g. Save The Gouldian Fund 2018b).

### 3.4.2 Grass Phenology

To assess phenology, three 1 x 1 m quadrats were examined, at the 0 – 1 m, 25 – 26 m, and 49 – 50 m marks of the 50 m transect (see Figure 3.5). All quadrats were placed on the right side of the transect, looking down the transect from the starting point. Within each quadrat, the total number of individuals of each foraging grass species was recorded, along with the number of individuals flowering and the number of individuals seeding.

### 3.4.3 Additional Environmental Factors

Additional factors affecting the availability of important foraging grasses were also assessed within the broader 50 m x 50 m quadrat at each monitoring site; specifically, evidence of fire and cattle activity. Evidence of each of these disturbance sources was scored categorically as either:

- None;
- Low;
- Medium;
- High; or
- Extreme.

Previous monitoring also included a “Patchy” category; we have not included this, as we consider it inconsistent with the approach of the other categories, which indicate a level of impact compared to a spatial extent of impact.

Scoring was based on the visible evidence of fire (e.g. burn scarring on trees, burnt vegetation etc.) or cattle activity (e.g. tracks, dung, evidence of grazing/trampling of vegetation, sightings of animals). Monitoring from the 2018 season and before based scores on “direct effect on the availability and distribution of critical feeding grasses” (e.g. Save The Gouldian Fund 2018b). We have taken any observed direct effects into account, but have considered all visible evidence of fire and cattle activity when determining the score. This allows the scoring data to be used to investigate indirect effects such as changes in species composition, which may be compromised if only visible effects on foraging grasses are considered.

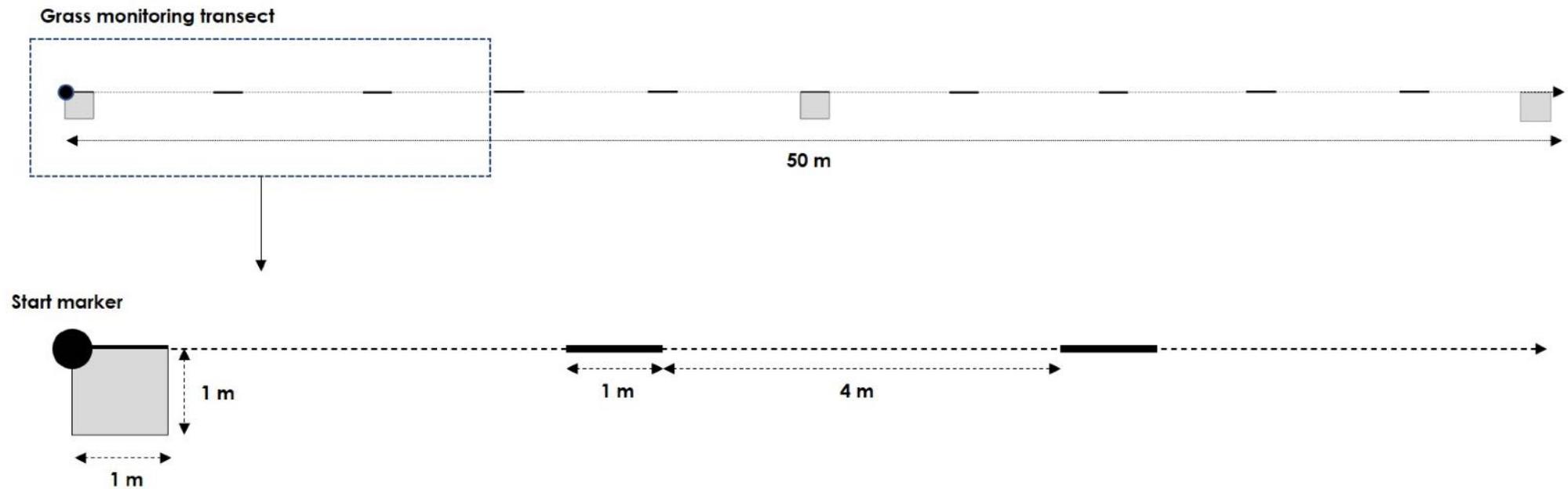


Figure 3.5: Schematic representation of 50 m grass monitoring transect and 1 m x 1 m phenology quadrats (adapted from Jackett 2021a).

## 3.5 Limitations

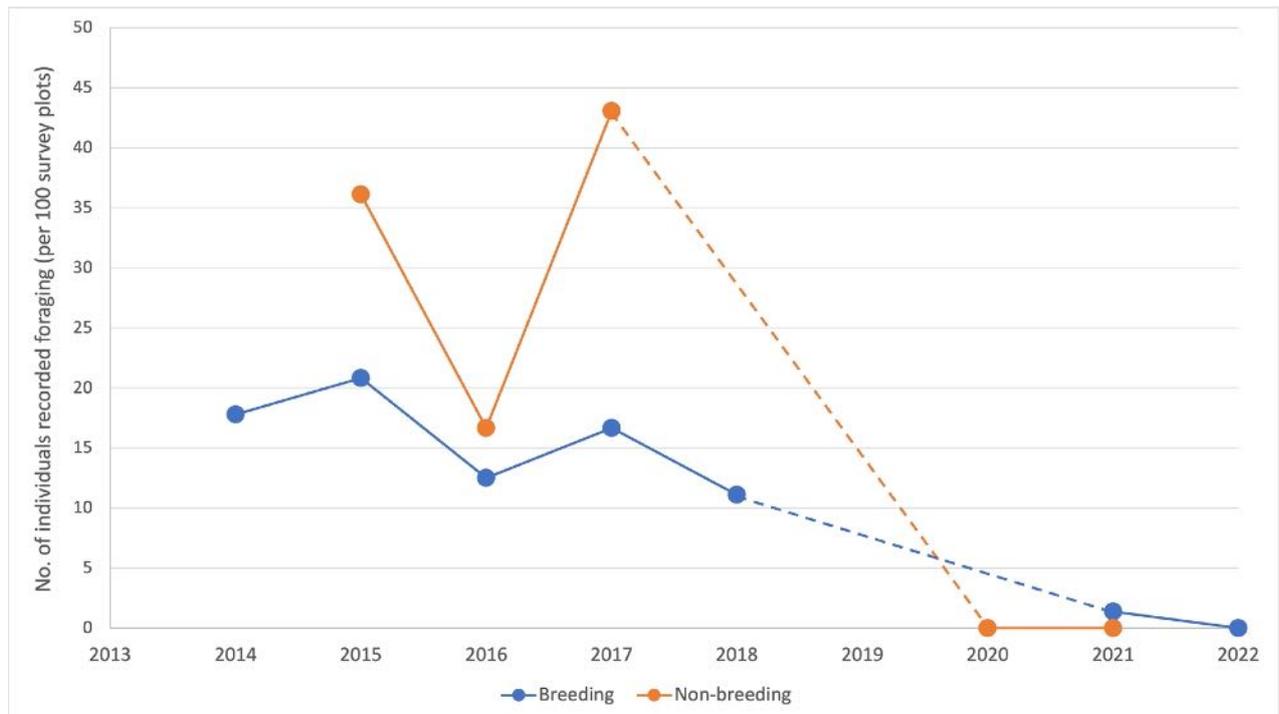
The results of the 2021-22 foraging activity and grass monitoring should be assessed giving consideration to the following potential limitations;

- Identification of grasses in the field when not seeding or flowering can be challenging, particularly during December when much of the grass is senescent, so it is possible that some of the grasses were not identified correctly, particularly during the December 2021 survey. However, as the overall trends in occurrence are broadly similar to previous seasons, we consider it unlikely that this was a widespread issue.
- Past reports (2014-2018) have not included grass measurements/cover from surveys later in the season (i.e. January to April), meaning that comparisons regarding grass cover could only be made using data from the December surveys. Additionally, grass cover data presented in these reports often appeared to be inconsistent, particularly with regard to the cover measures compared to the percentage of critical feeding grasses available (e.g. Table 4, Save The Gouldian Fund 2016c, Table 3, 2017c). We have taken the cover measures to be accurate for the purposes of comparisons in this report, as these should be fewer steps from the original raw data.

## 4.0 Results

### 4.1 Gouldian Finch Foraging Surveys

No Gouldian Finches were recorded from the study area during the systematic foraging surveys, which were undertaken during the December 2021 and March 2022 trips. In addition, no individuals were observed opportunistically on these trips. This follows on from similar observations in the previous season of monitoring (Figure 4.1).



**Figure 4.1:** Number of Gouldian Finch recorded foraging in the study area during systematic surveys (standardised for survey effort).

However, small numbers of Gouldian Finches were opportunistically observed in April and May 2022 during the nest box monitoring (Table 4.1; Figure 4.2). Two small flocks, including juveniles, were recorded in May (e.g. Plate 4.1), from both the northern (Sorby Hills) section of the study area and further south near Jandami Lane. Only very small numbers were observed in April, and only in the northern part of the study area (Plate 4.2).



**Plate 4.1:** Gouldian Finches in the study area on 19<sup>th</sup> May 2022, part of a larger flock of 25 birds.



Plate 4.2: Gouldian Finches in the study area on 12<sup>th</sup> April 2022.

Table 4.1: Gouldian Finch records from the study area for the 2021-22 season.

Date	Location		Count	Notes
	Latitude	Longitude		
12/04/2022	-15.434828	128.944427	2	Adult black-faced male and second individual (not seen well) observed perched in top of eucalypt before flying off to west.
12/04/2022	-15.436193	128.943174	3	Black-faced male, red-faced male, and black-faced female perched in <i>Eucalyptus miniata</i> , then flew south-west.
14/04/2022	-15.438644	128.941864	1+	At least one individual heard but couldn't be located; appeared to be moving with mixed feeding flock.
14/04/2022	-15.434917	128.944263	2	Black-faced male and female flushed from ground amongst spinifex ( <i>Triodia</i> ) and sorghum ( <i>Sarga/Sorghum</i> ) but not observed foraging. Flew north-west c. 50 m to forage in mixed flock at margin of areas of sorghum and <i>Themeda triandra</i> , though not observed specifically eating seed of either grass.
17/05/2022	-15.433457	128.945184	1+	At least one heard.
17/05/2022	-15.446029	128.942526	1+	Flyover of at least one bird, heard only.
19/05/2022	-15.485195	128.870608	15	Adult male (black-faced) and at least 2 juveniles with mixed finches including Pictorella Mannikin, Australian Zebra, Long-tailed, and Double-barred Finches (Star Finches also observed in vicinity). Seen perched up in trees and heard calling, then observed to fly to ground to forage with Long-tailed and Australian Zebra Finches, and Pictorella Mannikins. At least 15 subsequently flushed from ground, foraging amongst <i>Triodia</i> and small sorghum.
19/05/2022	-15.436958	128.947857	25	Small flock of c. 20 adults and at least four juveniles. Seen perching in trees in single species flock but loosely associated with small doves (Peaceful and Diamond), Long-tailed Finch, and mixed feeding flock dominated by Black-faced Woodswallows and White-winged Trillers. <i>Triodia</i> , sorghum and possibly <i>Heteropogon</i> in area but foraging not directly observed. Majority of flock eventually flew west.

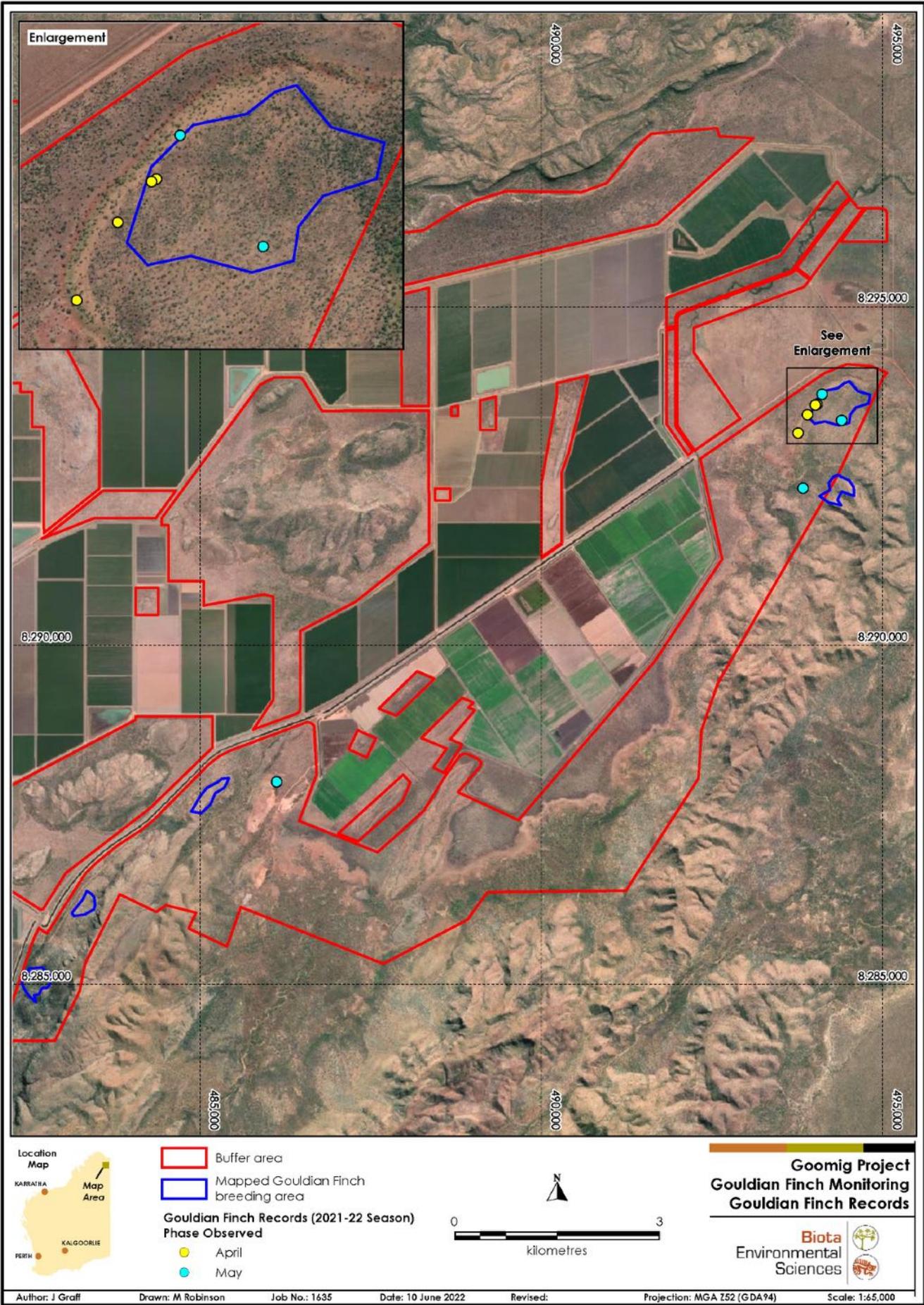


Figure 4.2: Gouldian Finch records from the study area during 2021-22 season

In total, nine other finch species were recorded from the study area from systematic and/or opportunistic observations during the current surveys:

- Pictorella Mannikin (*Heteromunia pectoralis*);
- Crimson Finch (*Neochmia phaeton*);
- Star Finch (*Bathilda ruficauda*);
- Double-barred Finch (*Stizoptera bichenovii*);
- Australian Zebra Finch (*Taeniopygia castanotis*);
- Masked Finch (*Poephila personata*);
- Long-tailed Finch (*Poephila acuticauda*);
- Yellow-rumped Mannikin (*Lonchura flaviprymna*); and
- Chestnut-breasted Mannikin (*Lonchura castaneothorax*).

Records of other finch species from the study area are shown in Figure 4.3 (December 2021 survey records) and Figure 4.4 (March 2022 survey records). Opportunistic observations of other finch species from the April and May nesting surveys were not comprehensive so have not been mapped.

The Long-tailed Finch (*Poephila acuticauda*) and Masked Finch (*P. personata*) are the two species that most regularly co-occur with Gouldian Finches. Large numbers of both species were observed this season during the December 2021 survey, with counts significantly higher for both species than counts in October 2020 (Table 4.2). However, counts in 2020 took place in October rather than December, and were also undertaken at different survey plots. March counts this season were slightly lower for both species, but were similar overall considering the difference in the number of survey plots.

**Table 4.2: Masked and Long-tailed Finch records from the study area for the 2021-22 season.**

Survey	Masked Finch		Long-tailed Finch	
	No. Survey Plots	Total Count	No. Survey Plots	Total Count
October 2020 <sup>1</sup>	8 (n=76)	49	12	114
March 2021	7 (n=72)	24	15	87
December 2021	8 (n=58)	103	10	414
March 2022	4 (n=58)	17	7	65

<sup>1</sup> Survey plots cover different areas to those used in 2021-22 surveys.

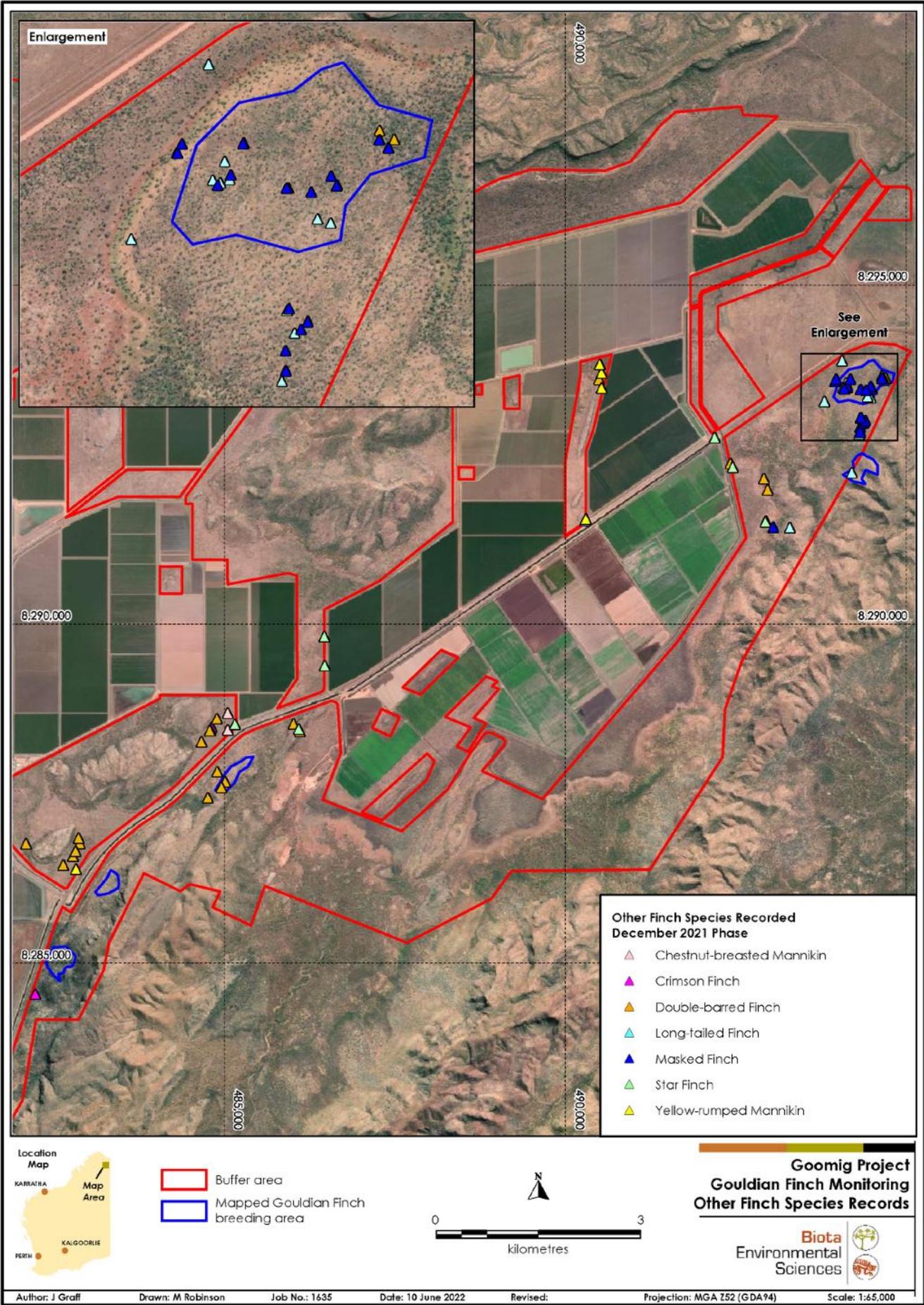


Figure 4.3: Location of other finch species records from study area in December 2021.

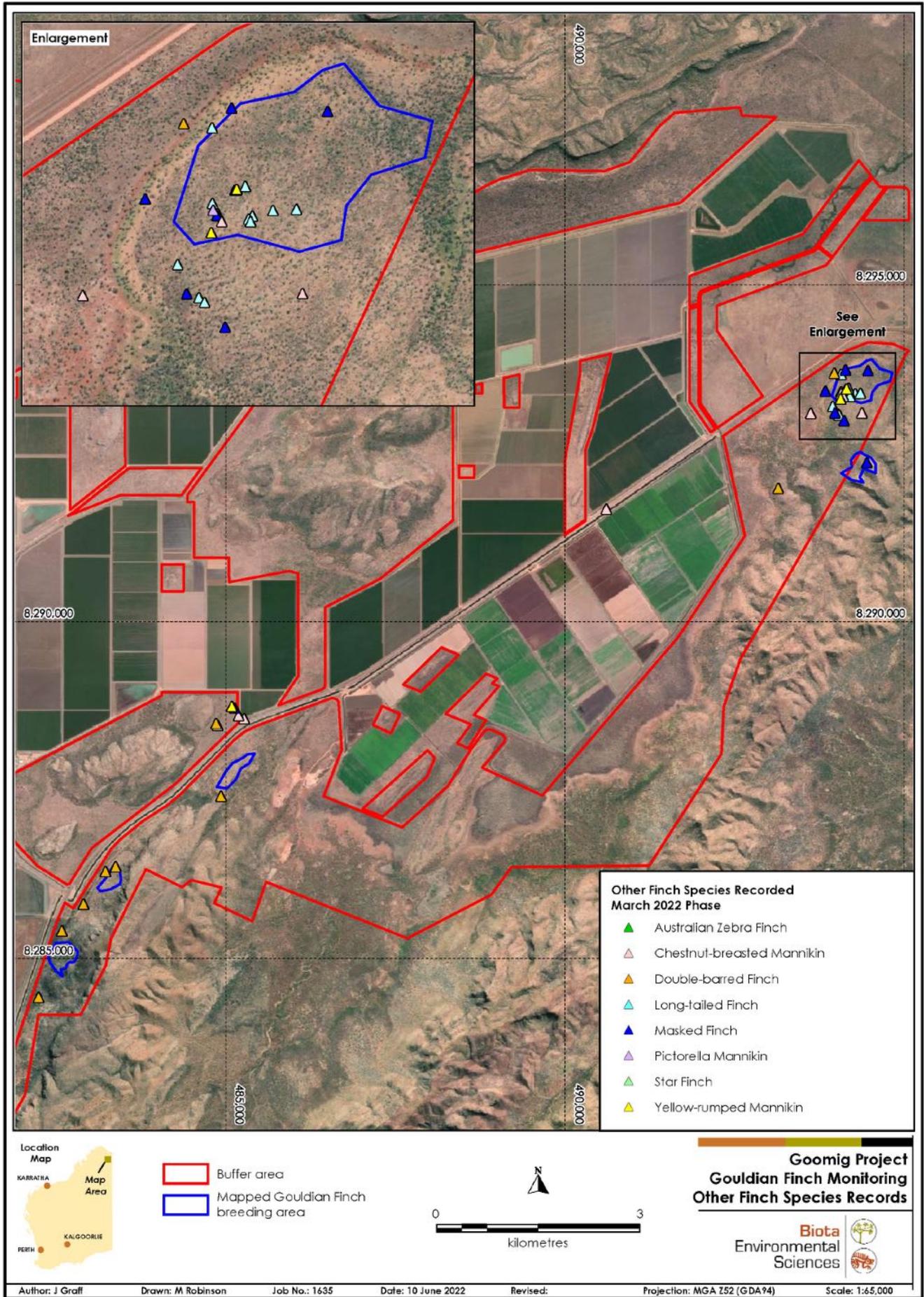


Figure 4.4: Location of other finch species records from study area in March 2022.

## 4.2 Grass Cover and Phenology

### 4.2.1 Grass Coverage

The dominant foraging grasses recorded within the study area were sorghum (*Sarga* spp.) and spinifex (*Triodia* spp.), followed by *Themeda triandra* (Table 4.3). This is consistent with results from December surveys in previous seasons, where sorghum and spinifex have been the dominant species. However, the total coverage of both grasses was lower in December 2021 than in previous seasons, while the extent of *Themeda triandra* was significantly higher than in previous seasons (Table 4.4). Spinifex (*Triodia* spp.) was recorded only on transects within Gouldian Finch breeding habitat, while most remaining foraging grasses were recorded only on transects within Gouldian Finch non-breeding habitat (Table 4.5).

**Table 4.3: Grass cover in the study area in 2021-22.**

Grass	December 2021			March 2022		
	Length <sup>1</sup> (cm)	Proportion (%)		Length <sup>1</sup> (cm)	Proportion (%)	
		Available Foraging Grass <sup>2</sup>	Total Cover <sup>3</sup>		Available Foraging Grass <sup>2</sup>	Total Cover <sup>3</sup>
<i>Sarga/Sorghum</i> spp.	4,002	45.4	9.8	9,407	62.3	22.9
<i>Triodia</i> spp.	1,910	21.7	4.7	3,338	22.1	8.1
<i>Themeda triandra</i>	1,596	18.1	3.9	1,880	12.5	4.6
<i>Chrysopogon fallax</i>	355	4.0	0.9	420	2.8	1.0
<i>Heteropogon</i> sp.	634	7.2	1.5	0	0.0	0.0
<i>Panicum decompositum</i>	322	3.7	0.8	0	0.0	0.0
<i>Alloteropsis semialata</i>	0	0.0	0.0	45	0.3	0.1

<sup>1</sup> Length measured under the tape.

<sup>2</sup> The proportion of the total extent of target foraging grasses.

<sup>3</sup> The proportion of the total extent of ground measured (i.e. percentage cover).

**Table 4.4: Comparison of December<sup>1</sup> grass coverage (percentage total cover) between years.**

Grass	Dec 2014	Dec 2015	Dec 2016	Dec 2017	2019-21 <sup>2</sup>	Dec 2021
<i>Sarga/Sorghum</i> spp.	14.9	18.5	22.4	25.0	No data	9.8
<i>Triodia</i> spp.	7.6	6.0	9.7	6.2	No data	4.7
<i>Themeda triandra</i>	0.1	0.1	0.2	0.5	No data	3.9
<i>Chrysopogon fallax</i>	1.1	1.1	1.5	1.6	No data	0.9
<i>Heteropogon</i> sp.	2.0	1.4	2.9	4.1	No data	1.5
<i>Panicum decompositum</i>	0.2	0.1	0.3	0.6	No data	0.8
<i>Alloteropsis semialata</i>	0.5	0.4	0.5	0.1	No data	0.0
<b>Total</b>	<b>26.4</b>	<b>27.6</b>	<b>37.5</b>	<b>38.1</b>	–	<b>21.6</b>

Note: Number of transects is 34 in 2014 and 2015, 38 in 2016, then 41 in 2017 and 2021.

<sup>1</sup> Data from later season surveys comparable to the March data are not presented in previous reports.

<sup>2</sup> Data from late 2021 available only from October, so has not been included here.

**Table 4.5: Comparison of grass coverage (percentage total cover) between Gouldian Finch breeding areas and non-breeding habitat.**

Grass	December 2021		March 2022	
	Breeding	Non-breeding	Breeding	Non-breeding
<i>Sarga/Sorghum</i> spp.	2.6	17.3	27.3	18.3
<i>Triodia</i> spp. (spinifex)	9.1	0.0	15.9	0.0
<i>Themeda triandra</i>	0.0	8.0	0.0	9.4
<i>Chrysopogon fallax</i>	0.0	1.8	0.0	2.1
<i>Heteropogon</i> sp.	0.0	3.2	0.0	0.0
<i>Panicum decompositum</i>	0.0	1.6	0.0	0.0
<i>Alloteropsis semialata</i>	0.0	0.0	0.0	0.2

## 4.2.2 Grass Phenology

Very few grasses were recorded flowering or seeding during the December 2021 surveys, as would be expected at the end of the dry season (Table 4.6). During the March 2022 surveys, over half of the sorghum individuals examined were seeding, while almost half of the *Themeda triandra* plants were flowering (Table 4.6). The majority of sorghum growing in Gouldian Finch breeding habitat was seeding in March 2022 (87.4% seeding), while most of the sorghum growing in the non-breeding areas was not seeding (6.6% seeding; Table 4.7).

**Table 4.6: Grass phenology in the study area 2021-22.**

Grass	December 2021			March 2022		
	Total	Flowering	Seeding	Total	Flowering	Seeding
<i>Sarga/Sorghum</i> spp.	162	0 0.0%	0 0.0%	716	2 0.3%	381 53.2%
<i>Triodia</i> spp.	150	0 0.0%	0 0.0%	127	4 3.1%	1 0.8%
<i>Themeda triandra</i>	34	0 0.0%	0 0.0%	69	34 49.3%	0 0.0%
<i>Chrysopogon fallax</i>	12	0 0.0%	0 0.0%	23	0 0.0%	0 0.0%
<i>Heteropogon</i> sp.	19	0 0.0%	0 0.0%	0	-	-
<i>Panicum decompositum</i>	19	0 0.0%	0 0.0%	0	-	-
<i>Alloteropsis semialata</i>	2	1 50.0%	0 0.0%	5	0 0.0%	0 0.0%

**Table 4.7: Comparison of grass phenology in March 2022 between Gouldian Finch breeding and non-breeding areas.**

Grass	Breeding			Non-breeding		
	Total	Flowering	Seeding	Total	Flowering	Seeding
<i>Sarga/Sorghum</i> spp.	413	2 0.5%	361 87.4%	303	0 0.0%	20 6.6%
<i>Triodia</i> spp.	127	4 3.1%	1 0.8%	0	-	-
<i>Themeda triandra</i>	0	-	-	69	34 49.3%	0 0.0%
<i>Chrysopogon fallax</i>	0	-	-	23	0 0.0%	0 0.0%
<i>Heteropogon</i> sp.	0	-	-	0	-	-
<i>Panicum decompositum</i>	0	-	-	0	-	-
<i>Alloteropsis semialata</i>	0	-	-	5	0 0.0%	0 0.0%

In comparison to previous years, the flowering and seeding rates of the grasses later in the season was lower; most notably in the case of spinifex (Table 4.8 and Table 4.9). However, no data are available for comparison from the past three seasons.

**Table 4.8: Comparison of percentage of grasses flowering in March (Feb-April<sup>1</sup>) between years.**

Grass	Mar 2015	Mar 2016	Feb 2017	Apr 2017	Mar 2018	2019-21	Mar 2022
<i>Sarga/Sorghum</i> spp.	13.2	3.4	63.2	8.7	5.7	No data	0.3
<i>Triodia</i> spp.	24.3	21.3	34.5	18.5	11.6	No data	3.1
<i>Themeda triandra</i>	4.6	1.2	4.5	2.6	2.1	No data	49.3
<i>Chrysopogon fallax</i>	1.3	0.0	3.6	0.0	0.0	No data	0.0
<i>Heteropogon</i> sp.	11.2	7.3	9.4	7.3	2.3	No data	-
<i>Panicum decompositum</i>	0.0	0.0	6.7	0.0	0.0	No data	-
<i>Alloteropsis semialata</i>	19.5	11.3	18.4	9.6	3.4	No data	0.0

<sup>1</sup> March results used for comparability except for 2017, when surveys were undertaken in February and April – both included.

**Table 4.9: Comparison of percentage of grasses seeding in March (Feb-April<sup>1</sup>) between years.**

Grass	Mar 2015	Mar 2016	Feb 2017	Apr 2017	Mar 2018	2019-21	Mar 2022
<i>Sarga/Sorghum</i> spp.	89.3	67.5	89.4	78.5	54.6	No data	53.2
<i>Triodia</i> spp.	58.7	43.2	24.5	64.5	45.6	No data	0.8
<i>Themeda triandra</i>	0.0	0.0	0.0	6.7	1.2	No data	0.0
<i>Chrysopogon fallax</i>	14.3	3.2	0.5	1.2	1.2	No data	0.0
<i>Heteropogon</i> sp.	9.3	0.0	0.0	0.0	0.0	No data	-
<i>Panicum decompositum</i>	0.0	0.0	0.0	0.0	0.0	No data	-
<i>Alloteropsis semialata</i>	15.4	2.3	7.6	3.6	2.8	No data	0.0

<sup>1</sup> March results used for comparability except for 2017, when surveys were undertaken in February and April – both included.

### 4.2.3 Fire

Evidence of fire was considerably more extensive at the study plots this season compared to recent monitoring seasons, resulting primarily from two fires that affected the locality. A large fire was active in the study area before and during the December 2021 survey phase and burnt many of the southern study plots east of Moonamang Rd, while a post-wet season prescribed burn was undertaken in the northern part of the study area (Sorby Hills area) in June-July 2021. Most burnt areas were recovering quickly following wet season rains by the time of the March 2022 monitoring phase.

**Table 4.10: Evidence of fire at the 41 grass study plots for the 2021-22 season.**

Fire Evidence	December 2021		March 2022	
	No. of Plots	%	No. of Plots	%
None	12	29.3	10	24.4
Low	12	29.3	25	61.0
Medium	9	22.0	6	14.6
High	4	9.8	0	0.0
Extreme	4	9.8	0	0.0

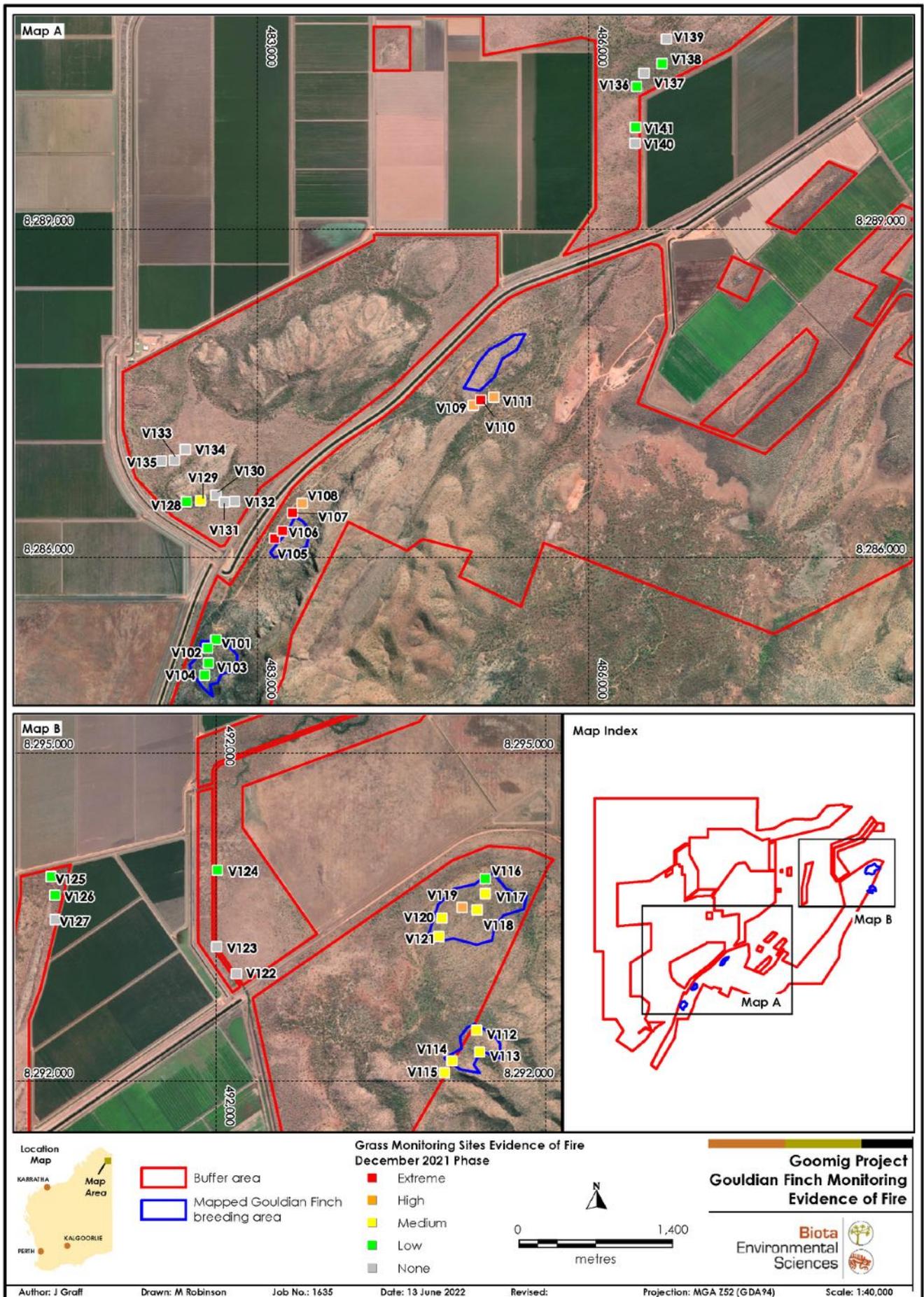


Figure 4.5: Evidence of fire at vegetation plots – December 2021.

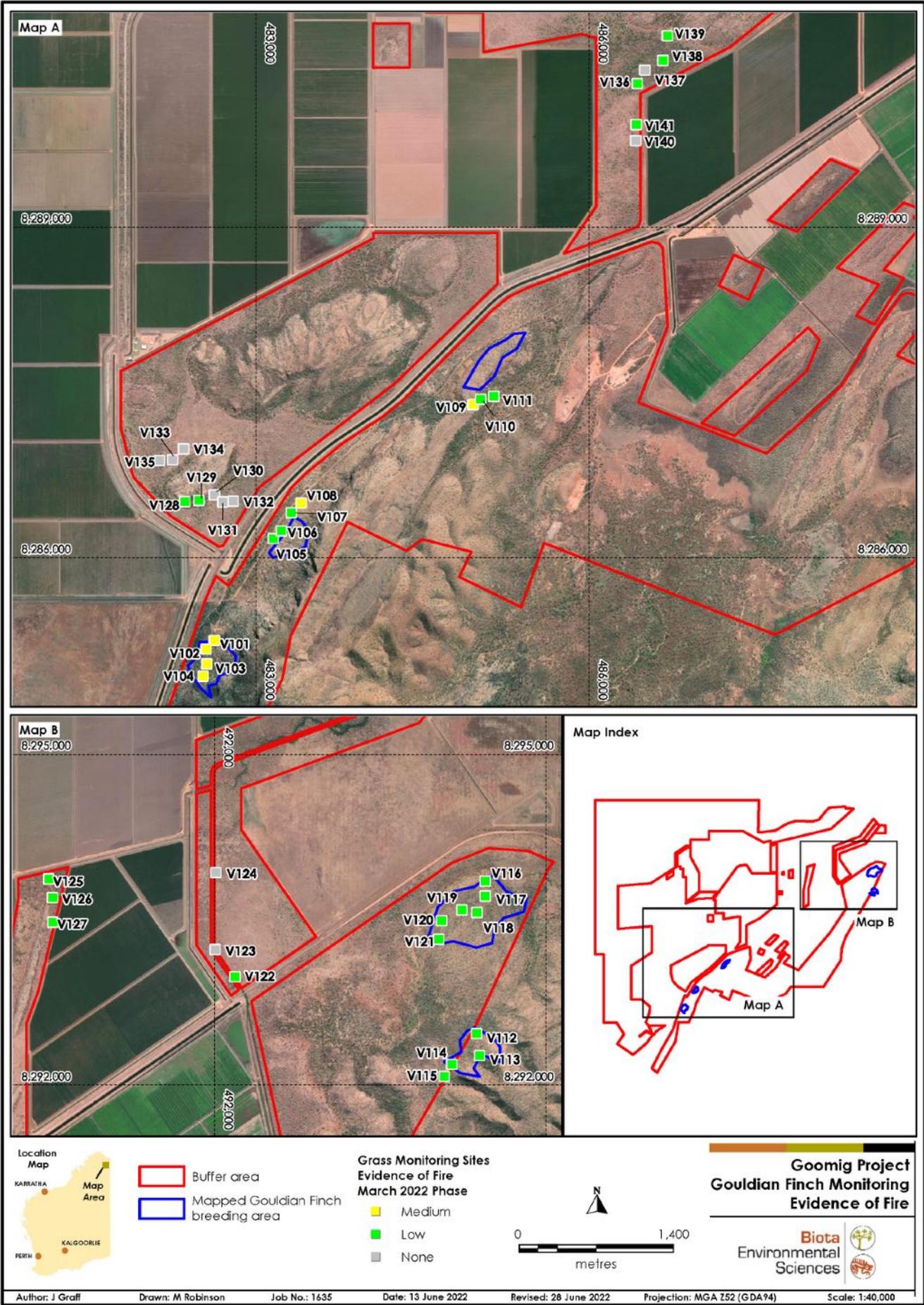


Figure 4.6: Evidence of fire at vegetation plots – March 2022.

## 4.2.4 Cattle Grazing

Some evidence of cattle activity and damage was observed within the study plots during the current study in December 2021, with eight study plots showing low evidence and two plots showing medium levels of cattle activity (Table 4.11). No evidence was observed in March 2022 after the wet season.

Evidence of cattle within study plots comprised tracks/pads and dung. No cattle were observed within the study plots, but a small herd were observed in the northern (Sorby) section of the study area in December 2021. A larger herd was observed in the same area during the nest box monitoring in May 2022, while a single animal was heard bellowing further to the north during the same survey.

The evidence of cattle activity was higher this season than during the past three monitoring seasons (2016-17, 2017-18 and 2020-21), where no evidence of cattle activity was recorded (Table 4.12).

**Table 4.11: Evidence of cattle at the 41 grass study plots for the 2021-22 season.**

Cattle Evidence	December 2021		March 2022	
	No. of Plots	%	No. of Plots	%
None	31	75.6	41	100.0
Low	8	19.5	0	0.0
Medium	2	4.9	0	0.0
High	0	0.0	0	0.0
Extreme	0	0.0	0	0.0

**Table 4.12: Comparison of percentage cattle evidence from 2021-22 with previous seasons.**

Cattle Evidence	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2020-21	2021-22
None	4.9	56.2	83.5	84.7	100.0	100.0	100.0	87.8
Low	18.3	5.4	3.4	3.2	0.0	0.0	0.0	9.8
Medium	12.2	36.9	13.1	12.1	0.0	0.0	0.0	2.4
High	18.3	1.5	0.0	0.0	0.0	0.0	0.0	0.0
Extreme	46.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0

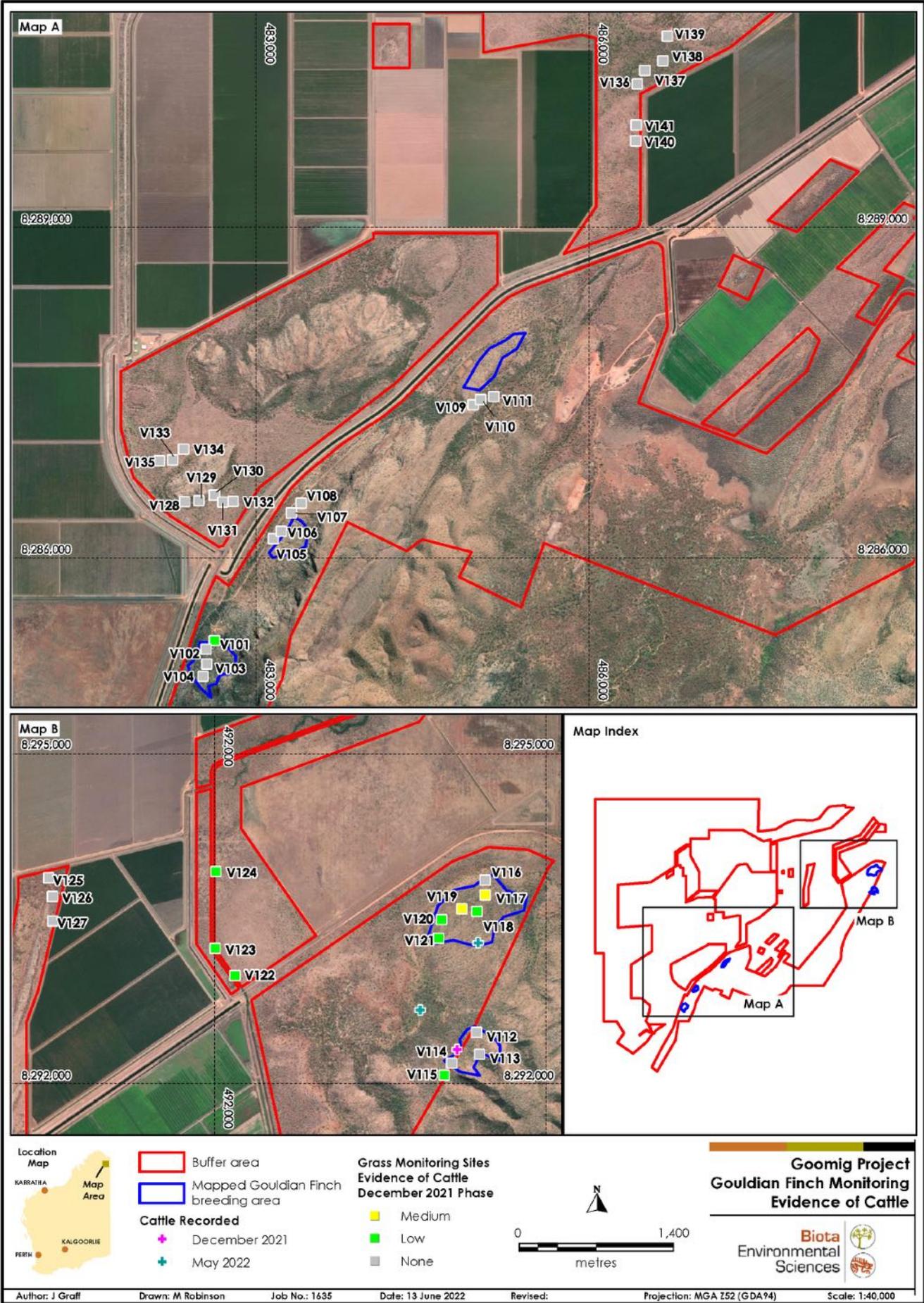


Figure 4.7: Evidence of cattle activity at vegetation plots – December 2021.

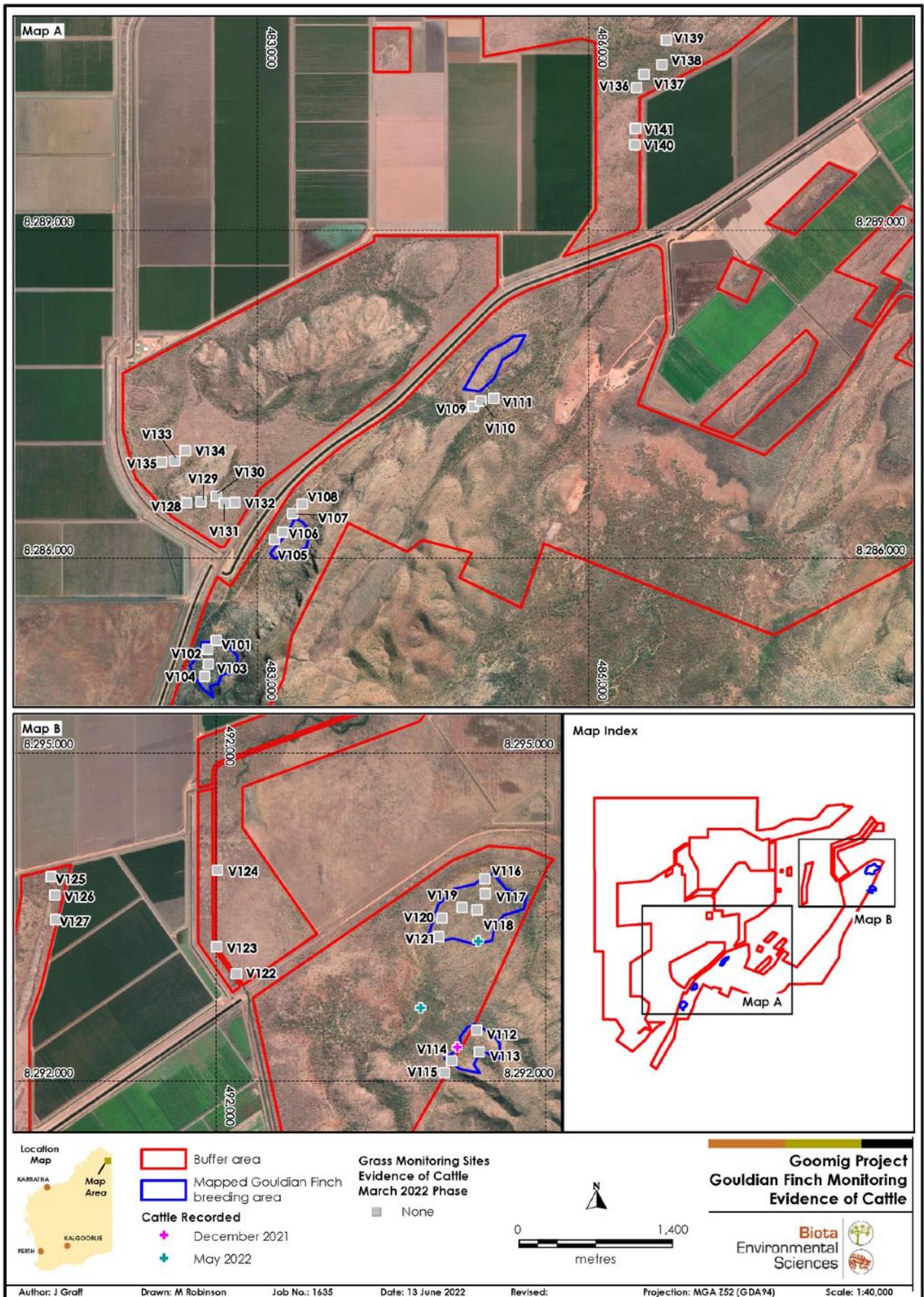


Figure 4.8: Evidence of cattle activity at vegetation plots – March 2022.

## 5.0 Discussion

The number of Gouldian Finches observed in the study area was higher than during the 2020-21 monitoring season, when only two single individuals were recorded. However, surveys during 2020-21 were undertaken only in October and March, and no Gouldian Finches were recorded during the December and March surveys in 2021-22. Evidence from the 2021-22 surveys indicated that Gouldian Finches moved back into the study area following the wet season, with a few individuals observed opportunistically during the April nest box monitoring, while two small flocks were observed in May. Hence, although larger numbers of Gouldian Finches were observed in the study area in May 2022, foraging activity in the study area during the wet season still appears to be very low.

It is likely that the lack of foraging activity in the later part of the wet season is related to the decline in breeding activity (and by implication, decline in breeding habitat quality) in the study area (Biota 2022). Previous foraging records in the breeding season are almost exclusively from breeding areas, and Gouldian Finches typically rely on feeding habitat in the immediate vicinity of their nesting sites during the breeding season (Brazill-Boast et al. 2011). The reasons for their absence earlier in the wet season prior to breeding are less apparent, though it is possible that birds are already moving to areas in proximity to their breeding areas by this time. It is also possible that the fires in the buffer area (particularly the late season fire in November-December 2021) reduced the availability of seed in these areas, and hence their suitability for Gouldian Finch foraging.

The presence of larger groups of Gouldian Finches in May 2022 indicates that suitable foraging habitat still exists within the study area, at least at certain times of year. Their occurrence in flocks including juveniles also suggests that these birds had dispersed into the study area from other local breeding areas after completion of breeding. Gouldian Finches tend to flock after breeding and make local movements following food resources (O'Malley 2006). Additionally, although the flocks contained juvenile birds, none were observed begging and all flew strongly with the flock, indicating that they were likely independent and had not fledged immediately prior.

No Gouldian Finches were observed directly eating seeds of any specific grasses during the opportunistic observations in April and May. Most foraging activity was observed taking place on the ground, so it is likely that birds were feeding on fallen seed. As observations were made primarily amongst sorghum (*Sarga/Sorghum* spp.) and spinifex (*Triodia* spp.), it is likely that seeds of these grasses were the primary food source. This is consistent with previous observations in the study area, which have almost exclusively involved birds feeding primarily on sorghum and spinifex seeds, or on fallen seed amongst sorghum and spinifex. Foraging on fallen seed at the end of the wet season is also consistent with previous foraging studies, which showed that Gouldian Finches shifted to foraging on accumulated fallen seed from annual grasses at the end of the wet season (Dostine et al. 2001). It is also consistent with the grass monitoring records from the study area, which showed sorghum and spinifex to be the most abundant foraging grasses within the study area.

Total coverage of foraging grasses was lower than in previous seasons based on December data, though sorghum and spinifex remained the dominant grasses by cover. It is likely that this is primarily due to the fires that impacted the study area in June-July and November-December 2021, as grasses on the transects affected had not yet regenerated from either fire by the December survey. Cover of both sorghum and spinifex had increased by March 2022 to similar levels to those recorded in December in previous seasons, but cover measures from March were not included in past reports so are not available for comparison. It is likely that cover increases in most years between December and March, due to new growth following onset of the wet season.

The other notable difference in grass cover was a significant increase in the extent of *Themeda triandra* this season compared to previous seasons. No clear reason for this increase was evident, though the extent of *T. triandra* in the October survey in 2020 was also notably higher (3.1% coverage) than any of the previous October surveys (0.8 – 1.0% coverage), which suggests this is part of an increasing trend rather than a major increase in this season only.

Flowering and seeding rates recorded this season in March 2022 were lower overall compared to the rates recorded at similar times in past seasons, though data are lacking for the three most recent seasons. This was most notable in the case of spinifex, with almost no plants recorded in flower (4 out of 127; 3.1%) or seeding (1 out of 127; 0.8%) this season, compared to previous years where 11.6–34.5% were recorded flowering and 24.5–64.5% were recorded seeding. The two fires that impacted the study area during 2021 affected most of the *Triodia*-dominated transects, which is likely the reason for the low rates of flowering and seeding observed. Conversely, most of the sorghum (*Sarga/Sorghum* spp.) in these areas were seeding in March 2022, while those in non-breeding habitats not affected by the fires were mostly not seeding. It is likely that as most sorghums in the area are primarily annual grasses, they responded more quickly following the fire than the perennial *Triodia* species, while sorghum in unburnt areas may have seeded earlier as a result of establishing earlier, or later due to increased competition with other perennial grasses and other plants.

An increase in cattle activity in the study area was also detected during the current season compared to that reported in recent seasons, including observations of a small herd in the northern section of the study area. Destocking of the buffer area was included as a management action in the buffer management plan (Strategen 2012), and is reported to have “substantially increased” the availability and productivity of Gouldian Finch foraging grasses (Save The Gouldian Fund 2018b), so the apparent increase in cattle activity is of concern for ongoing management of the buffer area. We note though that in late June 2022, approximately 100 cattle were reported to have been removed as part of the ongoing management of the buffer area, which should reduce cattle impacts, and destocking will continue to occur periodically.

## 6.0 Conclusions and Recommendations

The targets for the monitoring of Gouldian Finch wet-season foraging activity (Item 8) and grass productivity and phenology in the study area identified in the GFCP (Strategen 2014) are as follows:

- No reduction in baseline foraging activity which can be attributed to Buffer Area management (Item 8); and
- No reduction in baseline phenology and productivity which can be attributed to Buffer Area management (Item 9).

The results of the 2021-22 monitoring indicate that there has been a decline in baseline foraging activity during the wet season, as no Gouldian Finches were observed during systematic foraging surveys during the wet season systematic foraging surveys. We have taken the baseline level of wet season foraging activity to be the foraging activity observed during the 2014 breeding surveys; this is the earliest breeding season foraging data available to us, and is a closer fit to “wet season” than September-October non-breeding surveys, though the lack of specific dates for the foraging surveys (not included in reports from 2014-2018) means it is not possible to be absolutely certain they were undertaken during the wet season. We consider that the most likely cause of this decline in foraging activity in the wet season is the apparent decline in suitability of the breeding locations, and echo our recommendations regarding repair and re-installation of artificial nest boxes outlined in the breeding monitoring report (Biota 2022).

The results of the 2021-22 monitoring indicate that there have been some changes in the cover of Gouldian Finch foraging grasses. However, as fires impacted a significant portion of the study area in 2021, including a late-season fire in November-December, it is likely that much of the variation in cover and phenology of the key feeding grasses may have changed temporarily as a result. Providing late season fires do not become more regular, it is likely that these changes will be temporary. As such, it is not possible to clearly determine whether the target for grass productivity and phenology is being met this season; results from the 2022-23 monitoring should provide a clearer picture.

The apparent increase in the evidence of cattle in the study area is of concern given their potential impacts on Gouldian Finch habitat. The buffer management plan (Strategen 2012) contains a requirement to destock the study area, so we recommend ongoing removal of the cattle from the buffer area continues in accordance with this, noting that c. 100 cattle were removed in late June 2022 after the completion of these surveys.

Additionally, the identified targets require that any reductions in wet season foraging activity and grass phenology and productivity are not “attributed to Buffer Area management”. Identifying whether any recorded changes are attributable to buffer area management is difficult to do with certainty without concurrent data from control locations outside of the buffer area. This could, for example, allow the separation of the impact of any regional stochastic processes such as drought from local influences arising from the project itself. To address this, we recommend consideration be given to either:

- Expanding or revising the monitoring program to encompass foraging locations outside of the buffer area to provide control data; OR
- Incorporating relevant data obtained by other monitoring programs at suitable control sites in the region into the assessment and reporting each year.

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# Appendix 1

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## Location of 2-ha Survey Plots





Plot No.	Location (centre point)		Habitat
	Latitude	Longitude	
1	-15.512015	128.838781	Breeding
2	-15.510956	128.837698	Breeding
4	-15.512190	128.836817	Breeding
5	-15.513514	128.837416	Breeding
6	-15.502691	128.843371	Breeding
10	-15.486355	128.861985	Breeding
11	-15.485526	128.863311	Breeding
13	-15.447296	128.946463	Breeding
15	-15.446046	128.948531	Breeding
17	-15.445816	128.946988	Breeding
18	-15.435252	128.944886	Breeding
20	-15.434064	128.947560	Breeding
21	-15.432818	128.948634	Breeding
22	-15.433927	128.945931	Breeding
24	-15.436887	128.947946	Breeding
25	-15.436683	128.944449	Breeding
26	-15.436700	128.946182	Breeding
27	-15.435308	128.946667	Breeding
28	-15.435477	128.948439	Breeding
30	-15.434246	128.950758	Breeding
31	-15.434215	128.949230	Breeding
32	-15.437748	128.942051	Breeding <sup>1</sup>
33	-15.438498	128.943309	Breeding <sup>1</sup>
34	-15.439389	128.944499	Breeding <sup>1</sup>
35	-15.440025	128.945828	Breeding <sup>1</sup>
36	-15.439679	128.947357	Breeding <sup>1</sup>
37	-15.441529	128.946937	Breeding <sup>1</sup>
38	-15.441679	128.945227	Breeding <sup>1</sup>
39	-15.502029	128.844664	Breeding
41	-15.500636	128.844918	Breeding
42	-15.488754	128.860082	Breeding
44	-15.487520	128.860984	Breeding
46	-15.498475	128.846674	Non-breeding <sup>2</sup>
47	-15.497464	128.847867	Non-breeding <sup>2</sup>
48	-15.496212	128.848794	Non-breeding <sup>2</sup>
49	-15.495091	128.849916	Non-breeding <sup>2</sup>
50	-15.505136	128.841892	Non-breeding <sup>2</sup>
51	-15.506572	128.841015	Non-breeding <sup>2</sup>
52	-15.507666	128.839740	Non-breeding <sup>2</sup>
53	-15.498665	128.838061	Non-breeding <sup>2</sup>
54	-15.497515	128.839505	Non-breeding <sup>2</sup>
55	-15.496095	128.840622	Non-breeding <sup>2</sup>
56	-15.482519	128.857320	Non-breeding <sup>2</sup>
57	-15.480954	128.858508	Non-breeding <sup>2</sup>
58	-15.479554	128.859339	Non-breeding <sup>2</sup>
59	-15.477999	128.860160	Non-breeding <sup>2</sup>
63	-15.478885	128.873240	Non-breeding <sup>2</sup>
65	-15.481368	128.870001	Non-breeding <sup>2</sup>
66	-15.479758	128.871480	Non-breeding <sup>2</sup>
67	-15.449061	128.936403	Non-breeding <sup>2</sup>
68	-15.450907	128.937066	Non-breeding <sup>2</sup>

Plot No.	Location (centre point)		Habitat
	Latitude	Longitude	
69	-15.452557	128.937710	Non-breeding <sup>2</sup>
70	-15.453966	128.937223	Non-breeding <sup>2</sup>
71	-15.454740	128.935808	Non-breeding <sup>2</sup>
72	-15.453815	128.934650	Non-breeding <sup>2</sup>
73	-15.517931	128.834965	Non-breeding <sup>2</sup>
74	-15.516463	128.834909	Non-breeding <sup>2</sup>
75	-15.514963	128.835234	Non-breeding <sup>2</sup>

<sup>1</sup> Not within mapped breeding areas but in close proximity in potentially suitable habitat.

<sup>2</sup> We use the term "non-breeding habitat" rather than "buffer" used in previous reports to describe areas outside of the breeding areas to avoid confusion with the project buffer area.

## Appendix 2

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### Location and Orientation of Feeding Grass Transects





Transect ID	Start Point		Direction	End Point <sup>1</sup>		Habitat <sup>2</sup>
	Latitude	Longitude		Latitude	Longitude	
V101	-15.50998	128.837954	SW			Breeding
V102	-15.510692	128.837253	SSE			Breeding
V103	-15.511916	128.837311	SSE			Breeding
V104	-15.512927	128.836983	NW			Breeding
V105	-15.50163	128.842918	SW	-15.502003	128.842673	Breeding <sup>3</sup>
V106	-15.501016	128.843589	N			Breeding <sup>3</sup>
V107	-15.499496	128.844418	NE	-15.499136	128.844672	Breeding <sup>3</sup>
V108	-15.498699	128.845254	SSE			Breeding <sup>3</sup>
V109	-15.49062	128.859749	ESE			Breeding <sup>3</sup>
V110	-15.49019	128.860379	N			Breeding <sup>3</sup>
V111	-15.489967	128.861468	SSE			Breeding <sup>3</sup>
V112	-15.444789	128.947513	SSE			Breeding
V113	-15.446613	128.947742	SE			Breeding
V114	-15.447354	128.945399	NW			Breeding
V115	-15.448331	128.944789	NNW			Breeding <sup>3</sup>
V116	-15.432262	128.948225	SSE			Breeding
V117	-15.433489	128.948237	SE			Breeding
V118	-15.434844	128.947535	SSE			Breeding
V119	-15.434622	128.946273	NW			Breeding
V120	-15.435514	128.944561	NW			Breeding
V121	-15.437042	128.944297	ESE			Breeding
V122	-15.44012	128.927135	NE			Non-breeding
V123	-15.437878	128.92547	E			Non-breeding
V124	-15.431537	128.925544	E			Non-breeding
V125	-15.432073	128.911435	WSW			Non-breeding
V126	-15.433615	128.911749	E			Non-breeding
V127 <sup>4</sup>	-15.435621	128.911803	WSW	-15.435684	128.911347	Non-breeding
V128	-15.498584	128.835465	SE			Non-breeding
V129	-15.498496	128.836672	ENE			Non-breeding
V130	-15.498035	128.837967	NE			Non-breeding
V131	-15.498614	128.838668	S			Non-breeding
V132	-15.49856	128.839546	ENE	-15.49842	128.840032	Non-breeding
V133	-15.495138	128.834464	NNE			Non-breeding
V134	-15.494251	128.835365	ENE			Non-breeding
V135	-15.495202	128.833352	E			Non-breeding
V136	-15.464288	128.873552	NNW	-15.463891	128.873388	Non-breeding
V137	-15.463181	128.874206	NNE	-15.46279	128.874398	Non-breeding
V138	-15.462381	128.875716	NNE	-15.461959	128.875923	Non-breeding
V139	-15.460355	128.876092	NNW	-15.459918	128.875957	Non-breeding
V140	-15.468982	128.873429	W			Non-breeding
V141	-15.467654	128.873468	W			Non-breeding

<sup>1</sup> End point recorded where this differed substantially from end point estimated from transect direction.

<sup>2</sup> We use the term "non-breeding habitat" rather than "buffer" used in previous reports to describe areas outside of the breeding areas to avoid confusion with the project buffer area.

<sup>3</sup> Included as breeding as in immediate proximity to breeding areas and to retain consistency with previous surveys, but outside mapped breeding areas.

<sup>4</sup> Original location of V127 now cleared; new location in adjacent vegetation included here.



# Appendix 3

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## Bird Survey Data





Common Name	Species	Survey Plot																																	
		01		02		04		05		06		10		11		13		15		17		18		20		21		22		24					
		Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar				
Magpie Goose	<i>Anseranas semipalmata</i>																													25					
Plumed Whistling Duck	<i>Dendrocygna eytoni</i>																																		
Wandering Whistling Duck	<i>Dendrocygna arcuata</i>																																		
Radjah Shelduck	<i>Radjah radjah</i>																						2			2									
Green Pygmy Goose	<i>Nettapus pulchellus</i>																																		
Pacific Black Duck	<i>Anas superciliosa</i>																																		
Hardhead	<i>Aythya australis</i>																																		
Brown Quail	<i>Coturnix ypsilophora</i>																								1	2	1		1						
Spotted Nightjar	<i>Eurostopodus argus</i>																						2									1			
Tawny Frogmouth	<i>Podargus strigoides</i>																																		
Australian Owlet-nightjar	<i>Aegotheles cristatus</i>																				1														
Pacific Swift	<i>Apus pacificus</i>																																		
Australian Bustard	<i>Ardeotis australis</i>																																		
Pheasant Coucal	<i>Centropus phasianinus</i>						1				1																								
Pacific Koel	<i>Eudynamys orientalis</i>					1																			2		1								
Channel-billed Cuckoo	<i>Scythrops novaehollandiae</i>																																		
Horsfield's Bronze Cuckoo	<i>Chrysococcyx basalis</i>															1																		1	
Black-eared Cuckoo	<i>Chrysococcyx osculans</i>																								1										
Pallid Cuckoo	<i>Cacomantis pallidus</i>																																		
Brush Cuckoo	<i>Cacomantis variolosus</i>																		1								1								
Crested Pigeon	<i>Ocyphaps lophotes</i>																											1	2						
Diamond Dove	<i>Geopelia cuneata</i>																																		
Peaceful Dove	<i>Geopelia placida</i>	2	2	4	4		2	3	2		10		5	2			5	1	2		5	3	2	4	3	2	6	2	2				5		
Bar-shouldered Dove	<i>Geopelia humeralis</i>	2		2							2	2	3											1			2								
Torresian Imperial Pigeon	<i>Ducula spilorrhoa</i>																																		
Brolga	<i>Antigone rubicunda</i>																																		
Australasian Grebe	<i>Tachybaptus novaehollandiae</i>																																		
Red-backed Buttonquail	<i>Turnix maculosus</i>																																		
Chestnut-backed Buttonquail	<i>Turnix castanotus</i>																																		
Little Buttonquail	<i>Turnix velox</i>																																		
Bush Stone-curlew	<i>Burhinus grallarius</i>																																		
Masked Lapwing	<i>Vanellus miles</i>																																		
Black-fronted Dotterel	<i>Eseyornis melanops</i>																																		
Common Sandpiper	<i>Actitis hypoleucos</i>																																		
Oriental Pratincole	<i>Glareola maldivarum</i>																																		
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>																																		
Australasian Darter	<i>Anhinga novaehollandiae</i>																																		
Little Pied Cormorant	<i>Microcarbo melanoleucos</i>																																		
Little Black Cormorant	<i>Phalacrocorax sulcirostris</i>																																		
Australian White Ibis	<i>Threskiornis molucca</i>																																		
Straw-necked Ibis	<i>Threskiornis spinicollis</i>																																		
Glossy Ibis	<i>Plegadis falcinellus</i>																																		
Black Bittern	<i>Ixobrychus flavicollis</i>																																		
Nankeen Night Heron	<i>Nycticorax caledonicus</i>																																		
Eastern Cattle Egret	<i>Bubulcus coromandus</i>																																		6
White-necked Heron	<i>Ardea pacifica</i>																																		



Common Name	Species	Survey Plot																														
		01		02		04		05		06		10		11		13		15		17		18		20		21		22		24		
		Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	
Silver-backed Butcherbird	<i>Cracticus argenteus</i>		1	2	1	2	1		1								1															
Pied Butcherbird	<i>Cracticus nigrogularis</i>											1				2	1		1		1											
Black-faced Cuckooshrike	<i>Coracina novaehollandiae</i>	1										1				1								1	1		3	2	1			
White-bellied Cuckooshrike	<i>Coracina papuensis</i>							1				2						1									1	1				
White-winged Triller	<i>Lalage tricolor</i>																	2	2		3					1		1		1		
Varied Sittella	<i>Daphoenositta chrysoptera</i>																															
Rufous Whistler	<i>Pachycephala rufiventris</i>																			1		1				1						
Grey Shrikethrush	<i>Colluricincla harmonica</i>					1										1		1	2	2								1			2	
Sandstone Shrikethrush	<i>Colluricincla woodwardi</i>	2							2																							
Olive-backed Oriole	<i>Oriolus sagittatus</i>							1		1													1									
Willie Wagtail	<i>Rhipidura leucophrys</i>															2		2														
Northern Fantail	<i>Rhipidura rufiventris</i>																															
Magpie-lark	<i>Grallina cyanoleuca</i>			1	1					1			1														1			2		
Leaden Flycatcher	<i>Myiagra rubecula</i>	1						1																								
Paperbark Flycatcher	<i>Myiagra nana</i>																															
Torresian Crow	<i>Corvus orru</i>	1	1	1	1	1				1													1		1	1						
Jacky Winter	<i>Microeca fascinans</i>																					1										
Fairy Martin	<i>Petrochelidon ariel</i>																					3										
Tree Martin	<i>Petrochelidon nigricans</i>																															
Australian Reed Warbler	<i>Acrocephalus australis</i>																															
Rufous Songlark	<i>Cincloramphus mathewsi</i>																															
Tawny Grassbird	<i>Cincloramphus timoriensis</i>																															
Golden-headed Cisticola	<i>Cisticola exilis</i>					2																										
Mistletoebird	<i>Dicaeum hirundinaceum</i>															1														1		
Pictorella Mannikin	<i>Heteromunia pectoralis</i>																															
Crimson Finch	<i>Neochmia phaeton</i>																															
Star Finch	<i>Bathilda ruficauda</i>																															
Double-barred Finch	<i>Stizoptera bichenovii</i>																															
Australian Zebra Finch	<i>Taeniopygia castanotis</i>																															
Masked Finch	<i>Poephila personata</i>																	2			2							7				
Long-tailed Finch	<i>Poephila acuticauda</i>															2		6			17						20		7	2		
Yellow-rumped Mannikin	<i>Lonchura flaviprymna</i>																															
Chestnut-breasted Mannikin	<i>Lonchura castaneothorax</i>																															
Gouldian Finch	<i>Chloebia gouldiae</i>																															
<b>Species Total</b>		<b>11</b>	<b>6</b>	<b>9</b>	<b>8</b>	<b>12</b>	<b>7</b>	<b>7</b>	<b>6</b>	<b>4</b>	<b>7</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>0</b>	<b>11</b>	<b>4</b>	<b>6</b>	<b>11</b>	<b>8</b>	<b>10</b>	<b>13</b>	<b>7</b>	<b>11</b>	<b>9</b>	<b>15</b>	<b>11</b>	<b>16</b>	<b>11</b>	<b>9</b>	<b>8</b>	

Common Name	Species	Survey Plot																													
		25		26		27		28		30		31		32		33		34		35		36		37		38		39		41	
		Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar
Magpie Goose	<i>Anseranas semipalmata</i>																														
Plumed Whistling Duck	<i>Dendrocygna eytoni</i>																														
Wandering Whistling Duck	<i>Dendrocygna arcuata</i>																														
Radjah Shelduck	<i>Radjah radjah</i>		2																												
Green Pygmy Goose	<i>Nettapus pulchellus</i>																														
Pacific Black Duck	<i>Anas superciliosa</i>																														
Hardhead	<i>Aythya australis</i>																														
Brown Quail	<i>Coturnix ypsilophora</i>												2							1											
Spotted Nightjar	<i>Eurostopodus argus</i>															3		2													
Tawny Frogmouth	<i>Podargus strigoides</i>	1																													
Australian Owlet-nightjar	<i>Aegotheles cristatus</i>	1													1																
Pacific Swift	<i>Apus pacificus</i>																														
Australian Bustard	<i>Ardeotis australis</i>																														
Pheasant Coucal	<i>Centropus phasianinus</i>										1										1		1		1		1		1		
Pacific Koel	<i>Eudynamys orientalis</i>																														
Channel-billed Cuckoo	<i>Scythrops novaehollandiae</i>																														
Horsfield's Bronze Cuckoo	<i>Chrysococcyx basalis</i>																			1	1	1	1								
Black-eared Cuckoo	<i>Chrysococcyx osculans</i>																														
Pallid Cuckoo	<i>Cacomantis pallidus</i>																														
Brush Cuckoo	<i>Cacomantis variolosus</i>				1					1					1																
Crested Pigeon	<i>Ocyphaps lophotes</i>											1		2																	
Diamond Dove	<i>Geopelia cuneata</i>																			1											
Peaceful Dove	<i>Geopelia placida</i>		2		5	2	2	6	2	4	2	6	2	4	6		1	1	2		2		4	1	4		4	1	8	2	4
Bar-shouldered Dove	<i>Geopelia humeralis</i>							2		2	1	2	1		1		1		1						1	1					
Torresian Imperial Pigeon	<i>Ducula spilorrhoa</i>		3																												
Brolga	<i>Antigone rubicunda</i>				3																										
Australasian Grebe	<i>Tachybaptus novaehollandiae</i>																														
Red-backed Buttonquail	<i>Turnix maculosus</i>																														
Chestnut-backed Buttonquail	<i>Turnix castanotus</i>																	5						3							
Little Buttonquail	<i>Turnix velox</i>																														
Bush Stone-curlew	<i>Burhinus grallarius</i>	1													2		2														
Masked Lapwing	<i>Vanellus miles</i>																														
Black-fronted Dotterel	<i>Euseyonis melanops</i>																														
Common Sandpiper	<i>Actitis hypoleucos</i>																														
Oriental Pratincole	<i>Glareola maldivarum</i>			28																											
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>																														
Australasian Darter	<i>Anhinga novaehollandiae</i>																														
Little Pied Cormorant	<i>Microcarbo melanoleucos</i>																														
Little Black Cormorant	<i>Phalacrocorax sulcirostris</i>																														
Australian White Ibis	<i>Threskiornis molucca</i>																														
Straw-necked Ibis	<i>Threskiornis spinicollis</i>																														
Glossy Ibis	<i>Plegadis falcinellus</i>																														
Black Bittern	<i>Ixobrychus flavicollis</i>																														
Nankeen Night Heron	<i>Nycticorax caledonicus</i>																														

Common Name	Species	Survey Plot																													
		25		26		27		28		30		31		32		33		34		35		36		37		38		39		41	
		Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar
Eastern Cattle Egret	<i>Bubulcus coromandus</i>											18																			
White-necked Heron	<i>Ardea pacifica</i>																														
Great Egret	<i>Ardea alba</i>																														
Intermediate Egret	<i>Ardea intermedia</i>																														
Pied Heron	<i>Egretta picata</i>																														
White-faced Heron	<i>Egretta novaehollandiae</i>																														
Australian Pelican	<i>Pelecanus conspicillatus</i>																														
Black-shouldered Kite	<i>Elanus axillaris</i>																														
Wedge-tailed Eagle	<i>Aquila audax</i>																														
Brown Goshawk	<i>Accipiter fasciatus</i>																														
Spotted Harrier	<i>Circus assimilis</i>																														
Black Kite	<i>Milvus migrans</i>							1																						1	
Whistling Kite	<i>Haliastur sphenurus</i>											1																			
Oriental Dollarbird	<i>Eurystomus orientalis</i>	2				1		1		1		1								1		1					1				
Blue-winged Kookaburra	<i>Dacelo leachii</i>		2		2		2					1				3			2	1								4			
Sacred Kingfisher	<i>Todiramphus sanctus</i>										1		1	1													2				
Red-backed Kingfisher	<i>Todiramphus pyrrhopygius</i>																		1												
Rainbow Bee-eater	<i>Merops ornatus</i>																														
Nankeen Kestrel	<i>Falco cenchroides</i>																														
Australian Hobby	<i>Falco longipennis</i>																														
Brown Falcon	<i>Falco berigora</i>																														
Black Falcon	<i>Falco subniger</i>																		1		1										
Red-tailed Black Cockatoo	<i>Calyptorhynchus banksii</i>			1	2		3																	1	2						
Galah	<i>Eolophus roseicapilla</i>					2		5		20		1				4															
Little Corella	<i>Cacatua sanguinea</i>	5		50		8	3	21	4	12	3	5					1		8		5										
Sulphur-crested Cockatoo	<i>Cacatua galerita</i>																														
Red-winged Parrot	<i>Aprosmictus erythropterus</i>	3	2		2			1		3		2	1	5	1	4	1								1	2	2				
Red-collared Lorikeet	<i>Trichoglossus rubritorquis</i>				2																										
Great Bowerbird	<i>Chlamydera nuchalis</i>																												1		
Black-tailed Treecreeper	<i>Climacteris melanurus</i>		1	1															2				1								
Red-backed Fairywren	<i>Malurus melanocephalus</i>					1	3	2							3			1		2		2	2	3							
Rufous-throated Honeyeater	<i>Conopophila rufogularis</i>														1				1		4										
Little Friarbird	<i>Philemon citreogularis</i>	2				1					4	2					2														
Silver-crowned Friarbird	<i>Philemon argenticeps</i>																										1	1			
Brown Honeyeater	<i>Lichmera indistincta</i>																1		1												
Banded Honeyeater	<i>Cissomela pectoralis</i>																														
Blue-faced Honeyeater	<i>Entomyzon cyanotis</i>																		2												
White-throated Honeyeater	<i>Melithreptus albogularis</i>															2															
White-gaped Honeyeater	<i>Stomiopera unicolor</i>																														
Yellow-tinted Honeyeater	<i>Ptilotula flavescens</i>		2								1								1												
Yellow-throated Miner	<i>Manorina flavigula</i>																												2		
Striated Pardalote	<i>Pardalotus striatus</i>		1		3									1					1				1		1	1	1		1	1	
Weebill	<i>Smicromnis brevirostris</i>		2							2		1																		2	
White-throated Gerygone	<i>Gerygone olivacea</i>																														

Common Name	Species	Survey Plot																													
		25		26		27		28		30		31		32		33		34		35		36		37		38		39		41	
		Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar
Grey-crowned Babbler	<i>Pomatostomus temporalis</i>	2		3		4		4	3			4				4	3			3	5		4		4		4				
Masked Woodswallow	<i>Artamus personatus</i>				2																										
Black-faced Woodswallow	<i>Artamus cinereus</i>		3	1	2			4								1		1	60	4	14			2	10						
Australian Magpie	<i>Gymnorhina tibicen</i>																														
Silver-backed Butcherbird	<i>Cracticus argenteus</i>																														
Pied Butcherbird	<i>Cracticus nigrogularis</i>	2	1		1											2	3		1							1	2			1	
Black-faced Cuckooshrike	<i>Coracina novaehollandiae</i>		1					1	1					1	1	3					2	1			1	2					
White-bellied Cuckooshrike	<i>Coracina papuensis</i>	1	2				1									2	1	1	2			1	2	1			1				
White-winged Triller	<i>Lalage tricolor</i>			1	3	1		1				2						1	2	1	2	2	1	2	1	1					
Varied Sittella	<i>Daphoenositta chrysoptera</i>																	2		4											
Rufous Whistler	<i>Pachycephala rufiventris</i>	1		1		1		1		2	2	1	1		1					2	1	1			1	1					
Grey Shrikethrush	<i>Colluricincla harmonica</i>								1	2								2						1	1						
Sandstone Shrikethrush	<i>Colluricincla woodwardi</i>																												1		
Olive-backed Oriole	<i>Oriolus sagittatus</i>															1															
Willie Wagtail	<i>Rhipidura leucophrys</i>				1		1					1				1				1			1		1	1					
Northern Fantail	<i>Rhipidura rufiventris</i>																											1			
Magpie-lark	<i>Grallina cyanoleuca</i>	1						1				1	1			1	2												1		
Leaden Flycatcher	<i>Myiagra rubecula</i>									1																1					
Paperbark Flycatcher	<i>Myiagra nana</i>																														
Torresian Crow	<i>Corvus orru</i>											1												1					1		
Jacky Winter	<i>Microeca fascians</i>		2			1	1								2																
Fairy Martin	<i>Petrochelidon ariel</i>																														
Tree Martin	<i>Petrochelidon nigricans</i>																														
Australian Reed Warbler	<i>Acrocephalus australis</i>																														
Rufous Songlark	<i>Cincloramphus mathewsi</i>																														
Tawny Grassbird	<i>Cincloramphus timoriensis</i>																														
Golden-headed Cisticola	<i>Cisticola exilis</i>														1																
Mistletoebird	<i>Dicaeum hirundinaceum</i>	1													1	1														1	
Pictorella Mannikin	<i>Heteromunia pectoralis</i>		2																												
Crimson Finch	<i>Neochmia phaeton</i>																														
Star Finch	<i>Bathilda ruficauda</i>																														
Double-barred Finch	<i>Stizoptera bichenovii</i>									140		7																			1
Australian Zebra Finch	<i>Taeniopygia castanotis</i>																														
Masked Finch	<i>Poephila personata</i>		7			6		6				5						2		6	41			25							
Long-tailed Finch	<i>Poephila acuticauda</i>		6		32	5		1						2		2		7		10	126			232							
Yellow-rumped Mannikin	<i>Lonchura flaviprymna</i>																														
Chestnut-breasted Mannikin	<i>Lonchura castaneothorax</i>		5																				6								
Gouldian Finch	<i>Chloebia gouldiae</i>																														
<b>Species Total</b>		<b>13</b>	<b>18</b>	<b>8</b>	<b>11</b>	<b>14</b>	<b>7</b>	<b>16</b>	<b>7</b>	<b>10</b>	<b>8</b>	<b>14</b>	<b>11</b>	<b>13</b>	<b>8</b>	<b>14</b>	<b>11</b>	<b>12</b>	<b>17</b>	<b>11</b>	<b>15</b>	<b>11</b>	<b>11</b>	<b>9</b>	<b>12</b>	<b>12</b>	<b>9</b>	<b>5</b>	<b>5</b>	<b>3</b>	<b>8</b>





Common Name	Species	Survey Plot																														
		42		44		46		47		48		49		50		51		52		53		54		55		56		57		58		
		Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	
Silver-backed Butcherbird	<i>Cracticus argenteus</i>																															
Pied Butcherbird	<i>Cracticus nigrogularis</i>		3		2		1		1		2		1				1					1	1				1					
Black-faced Cuckooshrike	<i>Coracina novaehollandiae</i>																				3											
White-bellied Cuckooshrike	<i>Coracina papuensis</i>		4																									3		3		
White-winged Triller	<i>Lalage tricolor</i>														1																	
Varied Sittella	<i>Daphoenositta chrysoptera</i>																															
Rufous Whistler	<i>Pachycephala rufiventris</i>										1			1	1										1	1			1	1		
Grey Shrikethrush	<i>Colluricincla harmonica</i>																															
Sandstone Shrikethrush	<i>Colluricincla woodwardi</i>																															
Olive-backed Oriole	<i>Oriolus sagittatus</i>														2														2			
Willie Wagtail	<i>Rhipidura leucophrys</i>																													1		
Northern Fantail	<i>Rhipidura rufiventris</i>														1																	
Magpie-lark	<i>Grallina cyanoleuca</i>		2		1		1													1												
Leaden Flycatcher	<i>Myiagra rubecula</i>																1															
Paperbark Flycatcher	<i>Myiagra nana</i>																															
Torresian Crow	<i>Corvus orru</i>		1											1		2	1		2		1		2									
Jacky Winter	<i>Microeca fascinans</i>																															
Fairy Martin	<i>Petrochelidon ariel</i>																															
Tree Martin	<i>Petrochelidon nigricans</i>																															
Australian Reed Warbler	<i>Acrocephalus australis</i>																															
Rufous Songlark	<i>Cincloramphus mathewsi</i>																															
Tawny Grassbird	<i>Cincloramphus timoriensis</i>																															
Golden-headed Cisticola	<i>Cisticola exilis</i>																				7		4			1	3	1	2	10	4	10
Mistletoebird	<i>Dicaeum hirundinaceum</i>																				1		1		1							
Pictorella Mannikin	<i>Heteromunia pectoralis</i>																															
Crimson Finch	<i>Neochmia phaeton</i>																											2				
Star Finch	<i>Bathilda ruficauda</i>																															
Double-barred Finch	<i>Stizoptera bichenovii</i>	2																			2		19		4		4		8	3	2	
Australian Zebra Finch	<i>Taeniopygia castanotis</i>																															
Masked Finch	<i>Poephila personata</i>																															
Long-tailed Finch	<i>Poephila acuticauda</i>																															
Yellow-rumped Mannikin	<i>Lonchura flaviprymna</i>																															
Chestnut-breasted Mannikin	<i>Lonchura castaneothorax</i>																												2			
Gouldian Finch	<i>Chloebia gouldiae</i>																															
<b>Species Total</b>		<b>4</b>	<b>11</b>	<b>3</b>	<b>8</b>	<b>3</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>10</b>	<b>10</b>	<b>8</b>	<b>6</b>	<b>7</b>	<b>7</b>	<b>14</b>	<b>10</b>	<b>14</b>	<b>12</b>	<b>9</b>	<b>11</b>	<b>13</b>	<b>10</b>	<b>15</b>	<b>12</b>	<b>16</b>	<b>8</b>	

Common Name	Species	Survey Plot																												Total	
		59		63		65		66		67		68		69		70		71		72		73		74		75					
		Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar		
Magpie Goose	<i>Anseranas semipalmata</i>	12																										212	55		
Plumed Whistling Duck	<i>Dendrocygna eytoni</i>																											0	0		
Wandering Whistling Duck	<i>Dendrocygna arcuata</i>	3																										3	0		
Radjah Shelduck	<i>Radjah radjah</i>							3																				3	10		
Green Pygmy Goose	<i>Nettapus pulchellus</i>																											0	0		
Pacific Black Duck	<i>Anas superciliosa</i>		3																									1	3		
Hardhead	<i>Aythya australis</i>																											0	0		
Brown Quail	<i>Coturnix ypsilophora</i>																											10	5		
Spotted Nightjar	<i>Eurostopodus argus</i>																											6	2		
Tawny Frogmouth	<i>Podargus strigoides</i>								2					1														2	4		
Australian Owlet-nightjar	<i>Aegotheles cristatus</i>																											3	0		
Pacific Swift	<i>Apus pacificus</i>																											0	110		
Australian Bustard	<i>Ardeotis australis</i>																											0	0		
Pheasant Coucal	<i>Centropus phasianinus</i>		1		1											1	1	1					1	2		1		6	17		
Pacific Koel	<i>Eudynamis orientalis</i>																			1			1					8	0		
Channel-billed Cuckoo	<i>Scythrops novaehollandiae</i>																											0	0		
Horsfield's Bronze Cuckoo	<i>Chrysococcyx basalis</i>											1																9	3		
Black-eared Cuckoo	<i>Chrysococcyx osculans</i>																											0	1		
Pallid Cuckoo	<i>Cacomantis pallidus</i>																											0	0		
Brush Cuckoo	<i>Cacomantis variolosus</i>		1			1				1				1								1		1		1		12	1		
Crested Pigeon	<i>Ocyphaps lophotes</i>																											5	1		
Diamond Dove	<i>Geopelia cuneata</i>																											0	1		
Peaceful Dove	<i>Geopelia placida</i>	8	4	12	1	7	6	10	1	1	2	1	1	2		2	2	3	4	2	2	3	1	2	2		4	132	181		
Bar-shouldered Dove	<i>Geopelia humeralis</i>	2	2	4	1	4			1	3		1		2	1		1	6		2		2		3		5	1	80	28		
Torresian Imperial Pigeon	<i>Ducula spilorrhoa</i>																											0	3		
Brolga	<i>Antigone rubicunda</i>				2																							5	10		
Australasian Grebe	<i>Tachybaptus novaehollandiae</i>																											0	0		
Red-backed Buttonquail	<i>Turnix maculosus</i>																											0	0		
Chestnut-backed Buttonquail	<i>Turnix castanotus</i>														2		1											12	0		
Little Buttonquail	<i>Turnix velox</i>																											0	0		
Bush Stone-curlew	<i>Burhinus grallarius</i>																											2	4		
Masked Lapwing	<i>Vanellus miles</i>			1																								1	1		
Black-fronted Dotterel	<i>Euseyonis melanops</i>																											0	0		
Common Sandpiper	<i>Actitis hypoleucos</i>																											0	0		
Oriental Pratincole	<i>Glareola maldivarum</i>	300																										478	0		
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>																											0	0		
Australasian Darter	<i>Anhinga novaehollandiae</i>																											1	0		
Little Pied Cormorant	<i>Microcarbo melanoleucos</i>																											0	0		
Little Black Cormorant	<i>Phalacrocorax sulcirostris</i>																											0	2		
Australian White Ibis	<i>Threskiornis molucca</i>		13																									0	465		
Straw-necked Ibis	<i>Threskiornis spinicollis</i>																											0	0		
Glossy Ibis	<i>Plegadis falcinellus</i>																											2	0		
Black Bittern	<i>Ixobrychus flavicollis</i>		1																									0	1		
Nankeen Night Heron	<i>Nycticorax caledonicus</i>																											0	1		
Eastern Cattle Egret	<i>Bubulcus coromandus</i>																											24	0		
White-necked Heron	<i>Ardea pacifica</i>																											0	0		

Common Name	Species	Survey Plot																												Total	
		59		63		65		66		67		68		69		70		71		72		73		74		75					
		Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar		
Great Egret	<i>Ardea alba</i>								3																			1	18		
Intermediate Egret	<i>Ardea intermedia</i>																											0	0		
Pied Heron	<i>Egretta picata</i>																											0	0		
White-faced Heron	<i>Egretta novaehollandiae</i>																											0	2		
Australian Pelican	<i>Pelecanus conspicillatus</i>																					4						20	0		
Black-shouldered Kite	<i>Elanus axillaris</i>																											0	1		
Wedge-tailed Eagle	<i>Aquila audax</i>																											0	0		
Brown Goshawk	<i>Accipiter fasciatus</i>														2													1	2		
Spotted Harrier	<i>Circus assimilis</i>																											0	0		
Black Kite	<i>Milvus migrans</i>		3		1	2	1		1		1					1										2		18	16		
Whistling Kite	<i>Haliastur sphenurus</i>		1			2	1										1		1						1	1		8	10		
Oriental Dollarbird	<i>Eurystomus orientalis</i>					1										1				1		1						21	1		
Blue-winged Kookaburra	<i>Dacelo leachii</i>	1		1				2		3	3	2	5			1		2	1									25	21		
Sacred Kingfisher	<i>Todiramphus sanctus</i>					1								1														10	3		
Red-backed Kingfisher	<i>Todiramphus pyrrhopygius</i>																											0	2		
Rainbow Bee-eater	<i>Merops ornatus</i>															2				4								7	0		
Nankeen Kestrel	<i>Falco cenchroides</i>						1																					0	1		
Australian Hobby	<i>Falco longipennis</i>			1												1												1	1		
Brown Falcon	<i>Falco berigora</i>																											1	1		
Black Falcon	<i>Falco subniger</i>	1																										1	2		
Red-tailed Black Cockatoo	<i>Calyptorhynchus banksii</i>	4		1			1			6		8	5		3	5	5	13	1	6	5	3	2	1		3		202	53		
Galah	<i>Eolophus roseicapilla</i>				1		5		3		1				1													38	32		
Little Corella	<i>Cacatua sanguinea</i>	200	1	4	31	4	300	25	20																3			419	525		
Sulphur-crested Cockatoo	<i>Cacatua galerita</i>																											0	0		
Red-winged Parrot	<i>Aprosmictus erythropterus</i>		3	1						2							1							2				41	33		
Red-collared Lorikeet	<i>Trichoglossus rubitorquis</i>																5	5		2								29	17		
Great Bowerbird	<i>Chlamydera nuchalis</i>							1		1		1		1										1	1			13	5		
Black-tailed Treecreeper	<i>Climacteris melanurus</i>																											4	1		
Red-backed Fairywren	<i>Malurus melanocephalus</i>	3	2													2								3				43	24		
Rufous-throated Honeyeater	<i>Conopophila rufogularis</i>	5	1	1		1		2											2									19	10		
Little Friarbird	<i>Philemon citreogularis</i>									1												2		1				16	8		
Silver-crowned Friarbird	<i>Philemon argenticeps</i>																							2		1			7	9	
Brown Honeyeater	<i>Lichmera indistincta</i>					1	1				1			2										4		4		16	13		
Banded Honeyeater	<i>Cissomela pectoralis</i>																											0	0		
Blue-faced Honeyeater	<i>Entomyzon cyanotis</i>																											1	4		
White-throated Honeyeater	<i>Melithreptus albogularis</i>															1		1				1			2			15	19		
White-gaped Honeyeater	<i>Stomiopera unicolor</i>																							1				4	2		
Yellow-tinted Honeyeater	<i>Ptilotula flavescens</i>																											1	3		
Yellow-throated Miner	<i>Manorina flavigula</i>																					4	1					7	16		
Striated Pardalote	<i>Pardalotus striatus</i>															1				1								3	25		
Weebill	<i>Smicronis brevirostris</i>			1	2		1	3				1		1		6		1							2	1		47	36		
White-throated Gerygone	<i>Gerygone olivacea</i>																											0	0		
Grey-crowned Babbler	<i>Pomatostomus temporalis</i>																		3		3							34	34		
Masked Woodswallow	<i>Artamus personatus</i>																											0	4		
Black-faced Woodswallow	<i>Artamus cinereus</i>				5																							26	94		
Australian Magpie	<i>Gymnorhina tibicen</i>						1																					0	1		

Common Name	Species	Survey Plot																												Total	
		59		63		65		66		67		68		69		70		71		72		73		74		75					
		Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar	Dec	Mar		
Silver-backed Butcherbird	<i>Cracticus argentatus</i>													1														6	4		
Pied Butcherbird	<i>Cracticus nigrogularis</i>					1						1			1	1		1		2		1		1		1	9	35			
Black-faced Cuckooshrike	<i>Coracina novaehollandiae</i>									2	2						1									1	17	17			
White-bellied Cuckooshrike	<i>Coracina papuensis</i>		1	4				1		1							2										22	18			
White-winged Triller	<i>Lalage tricolor</i>								1											3							23	13			
Varied Sittella	<i>Daphoenositta chrysoptera</i>																										0	6			
Rufous Whistler	<i>Pachycephala rufiventris</i>	1								1		1		2		2	1	1								1	25	12			
Grey Shrikethrush	<i>Colluricincla harmonica</i>														1	1				1							9	11			
Sandstone Shrikethrush	<i>Colluricincla woodwardi</i>																							1			5	1			
Olive-backed Oriole	<i>Oriolus sagittatus</i>														1												7	2			
Willie Wagtail	<i>Rhipidura leucophrys</i>			1		1				1		2								2							16	5			
Northern Fantail	<i>Rhipidura rufiventris</i>																										1	1			
Magpie-lark	<i>Grallina cyanoleuca</i>	2											1							2		1				1	12	15			
Leaden Flycatcher	<i>Myiagra rubecula</i>																	1									6	0			
Paperbark Flycatcher	<i>Myiagra nana</i>																										0	0			
Torresian Crow	<i>Corvus orru</i>			1		1		1													1			1		2	13	16			
Jacky Winter	<i>Microeca fascinans</i>																			1							3	5			
Fairy Martin	<i>Petrochelidon ariel</i>																										3	0			
Tree Martin	<i>Petrochelidon nigricans</i>																										0	0			
Australian Reed Warbler	<i>Acrocephalus australis</i>																										0	0			
Rufous Songlark	<i>Cincloramphus mathewsi</i>																										0	0			
Tawny Grassbird	<i>Cincloramphus timoriensis</i>																										0	0			
Golden-headed Cisticola	<i>Cisticola exilis</i>	1	2																					2	3	4	29	28			
Mistletoebird	<i>Dicaeum hirundinaceum</i>																					1		1	1		11	1			
Pictorella Mannikin	<i>Heteromunia pectoralis</i>																										0	2			
Crimson Finch	<i>Neochmia phaeton</i>																						2				4	0			
Star Finch	<i>Bathilda ruficauda</i>					8														3							11	0			
Double-barred Finch	<i>Stizoptera bichenovii</i>					2					2												2				190	8			
Australian Zebra Finch	<i>Taeniopygia castanotis</i>																										0	0			
Masked Finch	<i>Poephila personata</i>																				11						103	17			
Long-tailed Finch	<i>Poephila acuticauda</i>														2												414	65			
Yellow-rumped Mannikin	<i>Lonchura flaviprymna</i>																										0	0			
Chestnut-breasted Mannikin	<i>Lonchura castaneothorax</i>																				6						6	13			
Gouldian Finch	<i>Chloebia gouldiae</i>																										0	0			
<b>Species Total</b>		<b>14</b>	<b>15</b>	<b>12</b>	<b>10</b>	<b>13</b>	<b>12</b>	<b>9</b>	<b>8</b>	<b>12</b>	<b>7</b>	<b>9</b>	<b>5</b>	<b>10</b>	<b>5</b>	<b>11</b>	<b>12</b>	<b>14</b>	<b>8</b>	<b>14</b>	<b>7</b>	<b>14</b>	<b>6</b>	<b>17</b>	<b>7</b>	<b>13</b>	<b>8</b>	<b>80</b>	<b>82</b>		

Common Name	Species	Opportunistic			
		Dec	Mar	Apr	May
Magpie Goose	<i>Anseranas semipalmata</i>	•		•	
Plumed Whistling Duck	<i>Dendrocygna eytoni</i>	•			
Wandering Whistling Duck	<i>Dendrocygna arcuata</i>	•			
Radjah Shelduck	<i>Radjah radjah</i>	•		•	
Green Pygmy Goose	<i>Nettapus pulchellus</i>	•			
Pacific Black Duck	<i>Anas superciliosa</i>	•			
Hardhead	<i>Aythya australis</i>	•			
Brown Quail	<i>Coturnix ypsilophora</i>	•		•	•
Spotted Nightjar	<i>Eurostopodus argus</i>				
Tawny Frogmouth	<i>Podargus strigoides</i>	•		•	•
Australian Owlet-nightjar	<i>Aegotheles cristatus</i>	•		•	•
Pacific Swift	<i>Apus pacificus</i>			•	
Australian Bustard	<i>Ardeotis australis</i>			•	•
Pheasant Coucal	<i>Centropus phasianinus</i>	•			
Pacific Koel	<i>Eudynamys orientalis</i>	•			
Channel-billed Cuckoo	<i>Scythrops novaehollandiae</i>	•			
Horsfield's Bronze Cuckoo	<i>Chrysococcyx basalis</i>		•	•	
Black-eared Cuckoo	<i>Chrysococcyx osculans</i>				
Pallid Cuckoo	<i>Cacomantis pallidus</i>				•
Brush Cuckoo	<i>Cacomantis variolosus</i>	•			
Crested Pigeon	<i>Ocyphaps lophotes</i>			•	
Diamond Dove	<i>Geopelia cuneata</i>			•	•
Peaceful Dove	<i>Geopelia placida</i>	•	•	•	•
Bar-shouldered Dove	<i>Geopelia humeralis</i>	•		•	•
Torresian Imperial Pigeon	<i>Ducula spilorrhoea</i>				
Brolga	<i>Antigone rubicunda</i>			•	•
Australasian Grebe	<i>Tachybaptus novaehollandiae</i>	•			
Red-backed Buttonquail	<i>Turnix maculosus</i>			•	•
Chestnut-backed Buttonquail	<i>Turnix castanotus</i>	•			•
Little Buttonquail	<i>Turnix velox</i>			•	•
Bush Stone-curlew	<i>Burhinus grallarius</i>	•	•	•	
Masked Lapwing	<i>Vanellus miles</i>	•			
Black-fronted Dotterel	<i>Euseyonis melanops</i>	•			
Common Sandpiper	<i>Actitis hypoleucos</i>	•			
Oriental Pratincole	<i>Glareola maldivarum</i>	•			
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>				•
Australasian Darter	<i>Anhinga novaehollandiae</i>	•			
Little Pied Cormorant	<i>Microcarbo melanoleucos</i>	•		•	
Little Black Cormorant	<i>Phalacrocorax sulcirostris</i>			•	•
Australian White Ibis	<i>Threskiornis molucca</i>			•	
Straw-necked Ibis	<i>Threskiornis spinicollis</i>			•	
Glossy Ibis	<i>Plegadis falcinellus</i>	•		•	
Black Bittern	<i>Ixobrychus flavicollis</i>	•			
Nankeen Night Heron	<i>Nycticorax caledonicus</i>	•		•	
Eastern Cattle Egret	<i>Bubulcus coromandus</i>	•			
White-necked Heron	<i>Ardea pacifica</i>			•	

Common Name	Species	Opportunistic			
		Dec	Mar	Apr	May
Great Egret	<i>Ardea alba</i>	•			
Intermediate Egret	<i>Ardea intermedia</i>	•		•	
Pied Heron	<i>Egretta picata</i>			•	
White-faced Heron	<i>Egretta novaehollandiae</i>	•		•	
Australian Pelican	<i>Pelecanus conspicillatus</i>				
Black-shouldered Kite	<i>Elanus axillaris</i>				
Wedge-tailed Eagle	<i>Aquila audax</i>			•	
Brown Goshawk	<i>Accipiter fasciatus</i>		•	•	•
Spotted Harrier	<i>Circus assimilis</i>	•			•
Black Kite	<i>Milvus migrans</i>	•		•	•
Whistling Kite	<i>Haliastur sphenurus</i>			•	•
Oriental Dollarbird	<i>Eurystomus orientalis</i>			•	
Blue-winged Kookaburra	<i>Dacelo leachii</i>		•	•	•
Sacred Kingfisher	<i>Todiramphus sanctus</i>		•	•	•
Red-backed Kingfisher	<i>Todiramphus pyrrhopygius</i>				•
Rainbow Bee-eater	<i>Merops ornatus</i>			•	•
Nankeen Kestrel	<i>Falco cenchroides</i>				
Australian Hobby	<i>Falco longipennis</i>		•	•	•
Brown Falcon	<i>Falco berigora</i>		•		•
Black Falcon	<i>Falco subniger</i>	•			
Red-tailed Black Cockatoo	<i>Calyptorhynchus banksii</i>	•		•	•
Galah	<i>Eolophus roseicapilla</i>		•	•	•
Little Corella	<i>Cacatua sanguinea</i>	•		•	•
Sulphur-crested Cockatoo	<i>Cacatua galerita</i>				•
Red-winged Parrot	<i>Aprosmictus erythropterus</i>	•	•	•	•
Red-collared Lorikeet	<i>Trichoglossus rubritorquis</i>			•	•
Great Bowerbird	<i>Chlamydera nuchalis</i>	•	•		•
Black-tailed Treecreeper	<i>Climacteris melanurus</i>	•	•	•	•
Red-backed Fairywren	<i>Malurus melanocephalus</i>			•	•
Rufous-throated Honeyeater	<i>Conopophila rufogularis</i>	•	•	•	•
Little Friarbird	<i>Philemon citreogularis</i>			•	•
Silver-crowned Friarbird	<i>Philemon argenticeps</i>	•		•	•
Brown Honeyeater	<i>Lichmera indistincta</i>	•	•	•	•
Banded Honeyeater	<i>Cissomela pectoralis</i>				•
Blue-faced Honeyeater	<i>Entomyzon cyanotis</i>	•	•	•	•
White-throated Honeyeater	<i>Melithreptus albogularis</i>	•	•	•	•
White-gaped Honeyeater	<i>Stomiopera unicolor</i>			•	•
Yellow-tinted Honeyeater	<i>Ptilotula flavescens</i>			•	•
Yellow-throated Miner	<i>Manorina flavigula</i>	•		•	•
Striated Pardalote	<i>Pardalotus striatus</i>		•	•	•
Weebill	<i>Smicromis brevirostris</i>		•	•	•
White-throated Gerygone	<i>Gerygone olivacea</i>	•			•
Grey-crowned Babbler	<i>Pomatostomus temporalis</i>		•	•	•
Masked Woodswallow	<i>Artamus personatus</i>				•
Black-faced Woodswallow	<i>Artamus cinereus</i>		•	•	•
Australian Magpie	<i>Gymnorhina tibicen</i>				

Common Name	Species	Opportunistic			
		Dec	Mar	Apr	May
Silver-backed Butcherbird	<i>Cracticus argenteus</i>			•	•
Pied Butcherbird	<i>Cracticus nigrogularis</i>	•	•	•	•
Black-faced Cuckooshrike	<i>Coracina novaehollandiae</i>		•	•	•
White-bellied Cuckooshrike	<i>Coracina papuensis</i>		•	•	•
White-winged Triller	<i>Lalage tricolor</i>		•	•	•
Varied Sittella	<i>Daphoenositta chrysoptera</i>				
Rufous Whistler	<i>Pachycephala rufiventris</i>		•	•	•
Grey Shrikethrush	<i>Colluricincla harmonica</i>			•	•
Sandstone Shrikethrush	<i>Colluricincla woodwardi</i>			•	•
Olive-backed Oriole	<i>Oriolus sagittatus</i>	•		•	•
Willie Wagtail	<i>Rhipidura leucophrys</i>		•	•	•
Northern Fantail	<i>Rhipidura rufiventris</i>				
Magpie-lark	<i>Grallina cyanoleuca</i>	•		•	•
Leaden Flycatcher	<i>Myiagra rubecula</i>		•	•	•
Paperbark Flycatcher	<i>Myiagra nana</i>			•	•
Torresian Crow	<i>Corvus orru</i>	•		•	•
Jacky Winter	<i>Microeca fascians</i>			•	•
Fairy Martin	<i>Petrochelidon ariel</i>			•	•
Tree Martin	<i>Petrochelidon nigricans</i>			•	•
Australian Reed Warbler	<i>Acrocephalus australis</i>			•	
Rufous Songlark	<i>Cincloramphus mathewsi</i>			•	•
Tawny Grassbird	<i>Cincloramphus timoriensis</i>			•	
Golden-headed Cisticola	<i>Cisticola exilis</i>			•	•
Mistletoebird	<i>Dicaeum hirundinaceum</i>			•	•
Pictorella Mannikin	<i>Heteromunia pectoralis</i>			•	•
Crimson Finch	<i>Neochmia phaeton</i>			•	
Star Finch	<i>Bathilda ruficauda</i>	•		•	•
Double-barred Finch	<i>Stizoptera bichenovii</i>	•	•	•	•
Australian Zebra Finch	<i>Taeniopygia castanotis</i>			•	•
Masked Finch	<i>Poephila personata</i>	•	•	•	•
Long-tailed Finch	<i>Poephila acuticauda</i>	•	•	•	•
Yellow-rumped Mannikin	<i>Lonchura flaviprymna</i>	•	•		•
Chestnut-breasted Mannikin	<i>Lonchura castaneothorax</i>	•	•	•	•
Gouldian Finch	<i>Chloebia gouldiae</i>			8	42
<b>Species Total</b>		<b>57</b>	<b>32</b>	<b>86</b>	<b>78</b>



## Appendix 4

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### Grass Transect Monitoring Data





## December

Transect	<i>Sarga/Sorghum</i> spp.	<i>Triodia</i> spp.	<i>Themeda</i> <i>triandra</i>	<i>Chrysopogon</i> <i>fallax</i>	<i>Heteropogon</i> sp.	<i>Panicum</i> <i>decompositum</i>	<i>Alloteropsis</i> <i>semialata</i>	Other
V101	113	141	-	-	-	-	-	-
V102	-	231	-	-	-	-	-	10
V103	-	300	-	-	-	-	-	-
V104	-	244	-	-	-	-	-	-
V105	-	53	-	-	-	-	-	-
V106	-	-	-	-	-	-	-	-
V107	-	-	-	-	-	-	-	-
V108	-	73	-	-	-	-	-	-
V109	-	63	-	-	-	-	-	-
V110	-	1	-	-	-	-	-	-
V111	-	43	-	-	-	-	-	-
V112	-	80	-	-	-	-	-	79
V113	-	46	-	-	-	-	-	192
V114	-	33	-	-	-	-	-	190
V115	2	-	-	-	-	-	-	215
V116	434	110	-	-	-	-	-	84
V117	-	53	-	-	-	-	-	115
V118	-	44	-	-	-	-	-	106
V119	-	-	-	-	-	-	-	58
V120	-	243	-	-	-	-	-	10
V121	-	152	-	-	-	-	-	18
V122	128	-	95	25	-	-	-	243
V123	74	-	10	20	-	80	-	139
V124	456	-	298	-	-	-	-	10
V125	143	-	90	-	25	-	-	30
V126	90	-	-	-	-	25	-	40
V127	22	-	-	-	-	-	-	194
V128	-	-	-	-	-	4	-	20
V129	-	-	-	-	-	4	-	68
V130	129	-	262	-	-	-	-	98
V131	429	-	30	50	-	-	-	203
V132	444	-	70	50	-	55	-	150
V133	60	-	468	-	18	-	-	-
V134	67	-	-	57	10	149	-	281

Transect	<i>Sarga/Sorghum</i> spp.	<i>Triodia</i> spp.	<i>Themeda</i> <i>triandra</i>	<i>Chrysopogon</i> <i>fallax</i>	<i>Heteropogon</i> sp.	<i>Panicum</i> <i>decompositum</i>	<i>Alloteropsis</i> <i>semialata</i>	Other
V135	178	-	247	46	-	5	-	70
V136	141	-	-	-	-	-	-	76
V137	567	-	-	-	-	-	-	147
V138	218	-	-	-	65	-	-	-
V139	244	-	-	107	-	-	-	65
V140	43	-	-	-	516	-	-	157
V141	20	-	26	-	-	-	-	486
<b>Total</b>	<b>4,002</b>	<b>1,910</b>	<b>1,596</b>	<b>355</b>	<b>634</b>	<b>322</b>	<b>0</b>	<b>3,554</b>

**March**

Transect	<i>Sarga/Sorghum</i> spp.	<i>Triodia</i> spp.	<i>Themeda</i> <i>triandra</i>	<i>Chrysopogon</i> <i>fallax</i>	<i>Heteropogon</i> sp.	<i>Panicum</i> <i>decompositum</i>	<i>Alloteropsis</i> <i>semialata</i>	Other
V101	120	90	-	-	-	-	-	90
V102	20	120	-	-	-	-	-	10
V103	-	290	-	-	-	-	-	10
V104	-	240	-	-	-	-	-	40
V105	290	-	-	-	-	-	-	380
V106	50	60	-	-	-	-	-	80
V107	270	80	-	-	-	-	-	30
V108	150	230	-	-	-	-	-	10
V109	52	138	-	-	-	-	-	92
V110	461	50	-	-	-	-	-	491
V111	861	480	-	-	-	-	-	180
V112	300	50	-	-	-	-	-	220
V113	650	-	-	-	-	-	-	120
V114	430	-	-	-	-	-	-	803
V115	800	-	-	-	-	-	-	380
V116	590	120	-	-	-	-	-	15
V117	-	30	-	-	-	-	-	100
V118	371	240	-	-	-	-	-	240
V119	-	-	-	-	-	-	-	960
V120	201	560	-	-	-	-	-	60
V121	122	560	-	-	-	-	-	250
V122	260	-	360	-	-	-	-	-
V123	40	-	70	-	-	-	-	190

V124	770	-	410	-	-	-	-	-
V125	435	-	-	-	-	-	-	110
V126	250	-	-	-	-	-	-	120
V127	-	-	-	-	-	-	-	710
V128	80	-	-	-	-	-	-	187
V129	190	-	-	-	-	-	-	392
V130	2	-	400	-	-	-	-	301
V131	250	-	-	-	-	-	-	744
V132	792	-	-	-	-	-	45	30
V133	-	-	410	140	-	-	-	110
V134	-	-	120	160	-	-	-	660
V135	150	-	110	120	-	-	-	210
V136	-	-	-	-	-	-	-	310
V137	-	-	-	-	-	-	-	270
V138	-	-	-	-	-	-	-	132
V139	150	-	-	-	-	-	-	-
V140	20	-	-	-	-	-	-	-
V141	280	-	-	-	-	-	-	-
<b>Total</b>	<b>9,407</b>	<b>3,338</b>	<b>1,880</b>	<b>420</b>	<b>0</b>	<b>0</b>	<b>45</b>	<b>9,037</b>



# Appendix 5

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## Grass Phenology Data





Transect	Quadrat	Month	Grass Species	Total Individuals	No. Flowering	No. Seeding
V101	1	Dec	<i>Sarga/Sorghum</i> spp.	14	0	0
V101	2	Dec	<i>Alloteropsis semialata</i>	1	0	0
V101	3	Dec	<i>Triodia</i> spp.	5	0	0
V102	1	Dec	<i>Triodia</i> spp.	4	0	0
V102	2	Dec	<i>Triodia</i> spp.	2	0	0
V102	3	Dec	<i>Triodia</i> spp.	7	0	0
V103	1	Dec	<i>Triodia</i> spp.	5	0	0
V103	2	Dec	<i>Triodia</i> spp.	7	0	0
V103	3	Dec	<i>Triodia</i> spp.	7	0	0
V104	1	Dec	<i>Triodia</i> spp.	3	0	0
V104	2	Dec	<i>Triodia</i> spp.	2	0	0
V104	3	Dec	<i>Triodia</i> spp.	5	0	0
V105	2	Dec	<i>Triodia</i> spp.	6	0	0
V105	3	Dec	<i>Triodia</i> spp.	10	0	0
V106	1	Dec	<i>Triodia</i> spp.	3	0	0
V107	1	Dec	<i>Triodia</i> spp.	1	0	0
V108	2	Dec	<i>Triodia</i> spp.	2	0	0
V108	3	Dec	<i>Triodia</i> spp.	4	0	0
V110	3	Dec	<i>Triodia</i> spp.	3	0	0
V111	1	Dec	<i>Triodia</i> spp.	1	0	0
V111	2	Dec	<i>Triodia</i> spp.	6	0	0
V112	1	Dec	<i>Triodia</i> spp.	8	0	0
V112	2	Dec	<i>Triodia</i> spp.	6	0	0
V113	1	Dec	<i>Triodia</i> spp.	5	0	0
V114	2	Dec	<i>Triodia</i> spp.	5	0	0
V114	3	Dec	<i>Triodia</i> spp.	8	0	0
V116	1	Dec	<i>Sarga/Sorghum</i> spp.	9	0	0
V116	1	Dec	<i>Triodia</i> spp.	1	0	0
V116	2	Dec	<i>Sarga/Sorghum</i> spp.	4	0	0
V116	2	Dec	<i>Triodia</i> spp.	3	0	0
V117	1	Dec	<i>Triodia</i> spp.	5	0	0
V118	2	Dec	<i>Triodia</i> spp.	1	0	0
V118	3	Dec	<i>Triodia</i> spp.	2	0	0
V119	2	Dec	<i>Triodia</i> spp.	1	0	0
V120	1	Dec	<i>Triodia</i> spp.	7	0	0
V120	2	Dec	<i>Triodia</i> spp.	6	0	0
V120	3	Dec	<i>Triodia</i> spp.	2	0	0
V121	1	Dec	<i>Triodia</i> spp.	6	0	0
V121	2	Dec	<i>Triodia</i> spp.	5	0	0
V121	3	Dec	<i>Triodia</i> spp.	1	0	0
V122	1	Dec	<i>Sarga/Sorghum</i> spp.	2	0	0
V122	2	Dec	<i>Themeda triandra</i>	4	0	0
V122	2	Dec	<i>Sarga/Sorghum</i> spp.	2	0	0
V122	3	Dec	<i>Sarga/Sorghum</i> spp.	5	0	0
V123	1	Dec	<i>Sarga/Sorghum</i> spp.	1	0	0
V123	2	Dec	<i>Sarga/Sorghum</i> spp.	3	0	0
V123	3	Dec	<i>Sarga/Sorghum</i> spp.	2	0	0
V124	1	Dec	<i>Sarga/Sorghum</i> spp.	2	0	0
V124	1	Dec	<i>Themeda triandra</i>	2	0	0
V124	2	Dec	<i>Themeda triandra</i>	2	0	0
V124	2	Dec	<i>Sarga/Sorghum</i> spp.	1	0	0
V124	3	Dec	<i>Themeda triandra</i>	7	0	0

Transect	Quadrat	Month	Grass Species	Total Individuals	No. Flowering	No. Seeding
V125	2	Dec	<i>Themeda triandra</i>	2	0	0
V125	2	Dec	<i>Sarga/Sorghum</i> spp.	1	0	0
V125	3	Dec	<i>Sarga/Sorghum</i> spp.	2	0	0
V126	2	Dec	<i>Panicum decompositum</i>	3	0	0
V127	3	Dec	<i>Sarga/Sorghum</i> spp.	7	0	0
V127	3	Dec	<i>Themeda triandra</i>	1	0	0
V128	2	Dec	<i>Panicum decompositum</i>	2	0	0
V129	3	Dec	<i>Panicum decompositum</i>	1	0	0
V130	1	Dec	<i>Themeda triandra</i>	2	0	0
V130	2	Dec	<i>Themeda triandra</i>	1	0	0
V130	3	Dec	<i>Sarga/Sorghum</i> spp.	5	0	0
V131	1	Dec	<i>Sarga/Sorghum</i> spp.	3	0	0
V131	2	Dec	<i>Sarga/Sorghum</i> spp.	2	0	0
V131	2	Dec	<i>Sarga/Sorghum</i> spp.	1	0	0
V131	3	Dec	<i>Chrysopogon fallax</i>	3	0	0
V131	3	Dec	<i>Sarga/Sorghum</i> spp.	1	0	0
V132	1	Dec	<i>Sarga/Sorghum</i> spp.	7	0	0
V132	2	Dec	<i>Sarga/Sorghum</i> spp.	9	0	0
V132	3	Dec	<i>Panicum decompositum</i>	10	0	0
V132	3	Dec	<i>Sarga/Sorghum</i> spp.	6	0	0
V132	3	Dec	<i>Themeda triandra</i>	1	0	0
V133	1	Dec	<i>Sarga/Sorghum</i> spp.	4	0	0
V133	2	Dec	<i>Themeda triandra</i>	4	0	0
V133	3	Dec	<i>Sarga/Sorghum</i> spp.	3	0	0
V133	3	Dec	<i>Themeda triandra</i>	1	0	0
V134	1	Dec	<i>Sarga/Sorghum</i> spp.	2	0	0
V134	2	Dec	<i>Panicum decompositum</i>	3	0	0
V134	3	Dec	<i>Chrysopogon fallax</i>	1	0	0
V134	3	Dec	<i>Sarga/Sorghum</i> spp.	1	0	0
V135	1	Dec	<i>Sarga/Sorghum</i> spp.	3	0	0
V135	1	Dec	<i>Alloteropsis semialata</i>	1	1	0
V135	2	Dec	<i>Chrysopogon fallax</i>	4	0	0
V135	2	Dec	<i>Themeda triandra</i>	3	0	0
V135	3	Dec	<i>Themeda triandra</i>	2	0	0
V135	3	Dec	<i>Themeda triandra</i>	2	0	0
V136	1	Dec	<i>Sarga/Sorghum</i> spp.	6	0	0
V136	2	Dec	<i>Sarga/Sorghum</i> spp.	3	0	0
V136	3	Dec	<i>Sarga/Sorghum</i> spp.	4	0	0
V137	1	Dec	<i>Sarga/Sorghum</i> spp.	8	0	0
V137	2	Dec	<i>Sarga/Sorghum</i> spp.	4	0	0
V138	1	Dec	<i>Sarga/Sorghum</i> spp.	10	0	0
V138	3	Dec	<i>Sarga/Sorghum</i> spp.	2	0	0
V139	1	Dec	<i>Sarga/Sorghum</i> spp.	5	0	0
V139	2	Dec	<i>Chrysopogon fallax</i>	2	0	0
V139	3	Dec	<i>Chrysopogon fallax</i>	2	0	0
V139	3	Dec	<i>Sarga/Sorghum</i> spp.	2	0	0
V140	1	Dec	<i>Sarga/Sorghum</i> spp.	5	0	0
V140	2	Dec	<i>Heteropogon</i> sp.	4	0	0
V140	3	Dec	<i>Heteropogon</i> sp.	15	0	0
V140	3	Dec	<i>Sarga/Sorghum</i> spp.	3	0	0
V141	1	Dec	<i>Sarga/Sorghum</i> spp.	2	0	0
V141	3	Dec	<i>Sarga/Sorghum</i> spp.	1	0	0

Transect	Quadrat	Month	Grass Species	Total Individuals	No. Flowering	No. Seeding
V101	1	Mar	<i>Sarga/Sorghum</i> spp.	1		
V102	1	Mar	<i>Sarga/Sorghum</i> spp.	1	1	0
V102	2	Mar	<i>Triodia</i> spp.	5	0	0
V102	3	Mar	<i>Triodia</i> spp.	4	0	1
V103	2	Mar	<i>Triodia</i> spp.	11	3	0
V103	3	Mar	<i>Triodia</i> spp.	3	0	0
V104	3	Mar	<i>Triodia</i> spp.	3	0	0
V105	1	Mar	<i>Sarga/Sorghum</i> spp.	3	0	3
V105	2	Mar	<i>Sarga/Sorghum</i> spp.	2	0	2
V106	1	Mar	<i>Sarga/Sorghum</i> spp.	4	0	0
V106	1	Mar	<i>Triodia</i> spp.	1	0	0
V106	2	Mar	<i>Sarga/Sorghum</i> spp.	1	0	1
V106	2	Mar	<i>Triodia</i> spp.	1	0	0
V106	3	Mar	<i>Sarga/Sorghum</i> spp.	3	0	1
V107	1	Mar	<i>Sarga/Sorghum</i> spp.	4	0	1
V107	2	Mar	<i>Sarga/Sorghum</i> spp.	3	0	0
V107	2	Mar	<i>Triodia</i> spp.	1	0	0
V107	3	Mar	<i>Sarga/Sorghum</i> spp.	2	0	0
V108	1	Mar	<i>Sarga/Sorghum</i> spp.	2		2
V108	2	Mar	<i>Sarga/Sorghum</i> spp.	5		4
V108	3	Mar	<i>Triodia</i> spp.	2	0	0
V109	1	Mar	<i>Sarga/Sorghum</i> spp.	1	0	0
V109	2	Mar	<i>Triodia</i> spp.	2	0	0
V109	3	Mar	<i>Triodia</i> spp.	8	0	0
V110	1	Mar	<i>Sarga/Sorghum</i> spp.	14	0	0
V110	2	Mar	<i>Sarga/Sorghum</i> spp.	5	0	0
V110	3	Mar	<i>Triodia</i> spp.	10	0	0
V110	3	Mar	<i>Sarga/Sorghum</i> spp.	1	0	0
V111	1	Mar	<i>Sarga/Sorghum</i> spp.	6	0	6
V111	1	Mar	<i>Triodia</i> spp. ( <i>spinifex</i> )	6	0	0
V111	2	Mar	<i>Sarga/Sorghum</i> spp.	12	0	1
V111	2	Mar	<i>Triodia</i> spp.	10	0	0
V111	3	Mar	<i>Sarga/Sorghum</i> spp.	10	0	8
V112	1	Mar	<i>Sarga/Sorghum</i> spp.	10	0	10
V112	3	Mar	<i>Sarga/Sorghum</i> spp.	30	0	30
V113	1	Mar	<i>Sarga/Sorghum</i> spp.	15	0	15
V113	2	Mar	<i>Sarga/Sorghum</i> spp.	30	0	30
V113	3	Mar	<i>Sarga/Sorghum</i> spp.	13	0	13
V114	1	Mar	<i>Sarga/Sorghum</i> spp.	60	0	60
V114	2	Mar	<i>Sarga/Sorghum</i> spp.	12	0	12
V114	3	Mar	<i>Sarga/Sorghum</i> spp.	8	0	8
V114	3	Mar	<i>Triodia</i> spp.	6	0	0
V115	1	Mar	<i>Sarga/Sorghum</i> spp.	11	0	11
V115	2	Mar	<i>Sarga/Sorghum</i> spp.	35	0	35
V115	3	Mar	<i>Sarga/Sorghum</i> spp.	11	0	11
V116	1	Mar	<i>Sarga/Sorghum</i> spp.	1	1	0
V116	2	Mar	<i>Sarga/Sorghum</i> spp.	4	0	4
V116	2	Mar	<i>Triodia</i> spp.	2	1	0
V117	2	Mar	<i>Triodia</i> spp.	15	0	0
V117	3	Mar	<i>Triodia</i> spp.	1	0	0
V118	1	Mar	<i>Sarga/Sorghum</i> spp.	25	0	25
V118	2	Mar	<i>Triodia</i> spp.	5	0	0

Transect	Quadrat	Month	Grass Species	Total Individuals	No. Flowering	No. Seeding
V118	3	Mar	<i>Sarga/Sorghum</i> spp.	30	0	30
V119	3	Mar	<i>Triodia</i> spp.	6	0	0
V120	1	Mar	<i>Triodia</i> spp.	5	0	0
V120	2	Mar	<i>Sarga/Sorghum</i> spp.	4	0	4
V120	2	Mar	<i>Triodia</i> spp.	4	0	0
V120	3	Mar	<i>Sarga/Sorghum</i> spp.	25	0	25
V120	3	Mar	<i>Triodia</i> spp.	2	0	0
V121	1	Mar	<i>Sarga/Sorghum</i> spp.	2	0	2
V121	2	Mar	<i>Triodia</i> spp.	8	0	0
V121	2	Mar	<i>Sarga/Sorghum</i> spp.	7	0	7
V121	3	Mar	<i>Triodia</i> spp.	6	0	0
V122	1	Mar	<i>Sarga/Sorghum</i> spp.	2	0	0
V122	2	Mar	<i>Sarga/Sorghum</i> spp.	18	0	0
V122	2	Mar	<i>Themeda triandra</i>	13	13	0
V122	3	Mar	<i>Sarga/Sorghum</i> spp.	12	0	0
V122	3	Mar	<i>Themeda triandra</i>	5	5	0
V123	1	Mar	<i>Themeda triandra</i>	2	0	0
V123	1	Mar	<i>Sarga/Sorghum</i> spp.	1	0	0
V123	2	Mar	<i>Sarga/Sorghum</i> spp.	4	0	0
V123	2	Mar	<i>Themeda triandra</i>	2	0	0
V123	3	Mar	<i>Sarga/Sorghum</i> spp.	3	0	0
V124	1	Mar	<i>Sarga/Sorghum</i> spp.	10	0	0
V124	1	Mar	<i>Themeda triandra</i>	5	5	0
V124	2	Mar	<i>Sarga/Sorghum</i> spp.	20	0	0
V124	2	Mar	<i>Themeda triandra</i>	12	0	0
V124	3	Mar	<i>Sarga/Sorghum</i> spp.	12	0	0
V124	3	Mar	<i>Themeda triandra</i>	8	8	0
V125	3	Mar	<i>Sarga/Sorghum</i> spp.	5	0	0
V126	1	Mar	<i>Sarga/Sorghum</i> spp.	40	0	0
V126	2	Mar	<i>Sarga/Sorghum</i> spp.	9	0	0
V127	3	Mar	<i>Sarga/Sorghum</i> spp.	2	0	0
V129	1	Mar	<i>Sarga/Sorghum</i> spp.	2	0	1
V129	2	Mar	<i>Sarga/Sorghum</i> spp.	10	0	2
V130	1	Mar	<i>Themeda triandra</i>	4	1	0
V130	3	Mar	<i>Sarga/Sorghum</i> spp.	3	0	0
V131	2	Mar	<i>Sarga/Sorghum</i> spp.	18	0	0
V131	3	Mar	<i>Sarga/Sorghum</i> spp.	12	0	0
V132	1	Mar	<i>Sarga/Sorghum</i> spp.	10	0	0
V132	2	Mar	<i>Sarga/Sorghum</i> spp.	35	0	0
V132	3	Mar	<i>Alloteropsis semialata</i>	5	0	0
V132	3	Mar	<i>Sarga/Sorghum</i> spp.	4	0	0
V133	1	Mar	<i>Chrysopogon fallax</i>	4	0	0
V133	1	Mar	<i>Themeda triandra</i>	3	0	0
V133	2	Mar	<i>Themeda triandra</i>	6	0	0
V133	3	Mar	<i>Chrysopogon fallax</i>	4	0	0
V133	3	Mar	<i>Themeda triandra</i>	2	0	0
V134	1	Mar	<i>Chrysopogon fallax</i>	4	0	0
V134	3	Mar	<i>Themeda triandra</i>	7	2	0
V135	1	Mar	<i>Sarga/Sorghum</i> spp.	1	0	0
V135	2	Mar	<i>Chrysopogon fallax</i>	6	0	0
V135	2	Mar	<i>Sarga/Sorghum</i> spp.	1	0	0
V135	3	Mar	<i>Chrysopogon fallax</i>	5	0	0

<b>Transect</b>	<b>Quadrat</b>	<b>Month</b>	<b>Grass Species</b>	<b>Total Individuals</b>	<b>No. Flowering</b>	<b>No. Seeding</b>
V137	3	Mar	<i>Sarga/Sorghum</i> spp.	30	0	15
V139	1	Mar	<i>Sarga/Sorghum</i> spp.	12	0	0
V139	3	Mar	<i>Sarga/Sorghum</i> spp.	5	0	0
V140	1	Mar	<i>Sarga/Sorghum</i> spp.	5	0	1
V141	1	Mar	<i>Sarga/Sorghum</i> spp.	12	0	1
V141	2	Mar	<i>Sarga/Sorghum</i> spp.	5	0	0



## Appendix 6

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### Grass Monitoring Transect Photos







**V101 – December 2021**



**V101 – March 2022**



**V102 – December 2021**



**V102 – March 2022**



**V103 – December 2021**



**V103 – March 2022**



**V104 – December 2021**



**V104 – March 2022**



**V105 – December 2021**



**V105 – March 2022**



**V106 – December 2021**



**V106 – March 2022**



**V107 – December 2021**



**V107 – March 2022**



**V108 – December 2021**



**V108 – March 2022**



V109 – December 2021



V109 – March 2022



V110 – December 2021



V110 – March 2022



**V111 – December 2021**



**V111 – March 2022**



**V112 – December 2021**



**V112 – March 2022**



V113 – December 2021



V113 – March 2022



V114 – December 2021



V114 – March 2022



**V115 – December 2021**



**V115 – March 2022**



**V116 – December 2021**



**V116 – March 2022**



**V117 – December 2021**



**V117 – March 2022**



**V118 – December 2021**



**V118 – March 2022**

No photo



V119 – March 2022

V119 – December 2021



V120 – December 2021



V120 – March 2022



**V121 – December 2021**



**V121 – March 2022**



**V122 – December 2021**



**V122 – March 2022**



**V123 – December 2021**



**V123 – March 2022**



**V124 – December 2021**



**V124 – March 2022**



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**V138 – December 2021**



**V138 – March 2022**



**V139 – December 2021**



**V139 – March 2022**



**V140 – December 2021**



**V140 – March 2022**



**V141 – December 2021**



**V141 – March 2022**