Ord-East Kimberley Expansion Project - Weaber Plain Development Area

Gouldian Finch Non Breeding Habitat and Vegetation Assessment (2017)

Prepared for
Ord-East Kimberley Expansion Project
Department of Regional Development

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Summary

As part of the requirement for State approval under the *Environment Protection and Biodiversity Conservation Act 1999*, an assessment and regular monitoring of the endangered Gouldian finch (*Erythrura gouldiae*) is required during the operation of the Ord River Irrigation Area Weaber Plain Development Project in the Kimberley, Western Australia. This report details the findings from the habitat and vegetation surveys of non-breeding Gouldian finches (October 2016 – April 2017).

In accordance with the EPBC Act (6AIV) and GFMP (3-5, 3-6, 3-9) conditions, this work specifically provides:

1) *An assessment of vegetation condition in areas identified as key Gouldian Finch habitat within the Buffer Area and immediate surrounding reserves*. This includes monitoring the temporal and spatial availability of grasses, as well as the impacts of fire and grazing on Gouldian finch feeding grasses.
2) *Annual monitoring of the phenology and productivity of wet season feeding habitat, and assessment of their use by Gouldian Finches*.

Key results included:

1) No evidence of grazing pressure in Gouldian finch breeding areas, feeding areas and in the general Buffer Area.
2) Potential feeding grasses were present in all habitats, and included 5 of the 9 critical feeding grasses for Gouldian finches. Gouldian finch habitats were dominated by *Sorghum spp*. and *Triodia spp*., both of which are the most favoured feeding grasses.
3) Phenology surveys showed that *Sorghum spp*., *Triodia spp*. and *Alloteropsis semialata* were flowering and/or seeding during the wet season, and in very high numbers (67-89%).
4) Above average rainfall in the region (more than twice the long-term average) likely contributed to the highest number of flowering and seeding grasses recorded since surveys started in 2007.

This work provides the required annual data for (1) long-term monitoring of Gouldian finches within the Weaber Plain Development Project, and (2) the conditions detailed in the EPBC Act and GFMP, as well as important on-going and baseline data to ensure appropriate management of the endangered Gouldian finch.

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1 Introduction

As a requirement for State approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), Gouldian finch (*Erythrura gouldiae*) populations and their associated habitats (breeding and feeding areas) need to be regularly surveyed during the construction and operation of the Ord River Irrigation Area (ORIA) Weaber Plain Development Project (the Project) in the eastern Kimberley, Western Australia. This is to ensure appropriate management of the endangered Gouldian finch and its habitat before, during and after completion of the development. The Gouldian finch is currently listed as *Endangered and Migratory* under the *Environment Protection and Biodiversity Conservation Act 1999* and listed as "rare or likely to become extinct" under the *Wildlife Conservation Act 1950*.

Because of the status of the Gouldian finch, the current survey sets out to build the baseline groundwork and guidelines for the maintenance of sustainable populations of Gouldian finches in the Project area.

1.1 Gouldian Finch Distribution

The Gouldian finch is an obligate granivorous bird that lives only in the northern savanna region of Australia. Formerly ranging from Cape York Peninsula in Queensland, through the northern half of the Northern Territory, to the Kimberley region in Western Australia, Gouldian finches were once believed to be amongst the most common finches of the region (O'Malley 2006). However, within the last century (and 50 years in particular), Gouldian finch populations have undergone population declines and a contraction of their range. The species is now recorded reliably at only a few sites within the Northern Territory, Western Australia and Queensland. A large known and important Gouldian finch population is located in the Wyndham area, about 100 km west of the Weaber Plain Development Project area. Current national Gouldian finch estimates suggest a population of less than 2500 individuals with no more than 250 birds (and frequently much less) where sub-populations occur (O'Malley 2006).

1.2 General Habitat

Gouldian finches currently utilise only a small percentage of the range they formerly occupied (O'Malley 2006), and it is likely that most habitats currently used are not optimal (Brazill-Boast and Pryke 2011). In addition, due to special dietary needs (detailed in 1.3.1) and temporal and geographical variability of feeding grasses, preferred Gouldian finch habitat varies between the dry (breeding) season (ca. January - June), and non-breeding seasons (ca. July - January).

1.2.1 Breeding Habitat

Known breeding habitat for Gouldian finches includes rocky hills with hollow-bearing *Eucalyptus* (e.g. *Eucalyptus brevifolia*, *E. tintinnans*) and *Corymbia* species (e.g. *Corymbia dichromophloia*). Gouldian finches have very specific nesting requirements and require robust and deep hollows with small diameters (Tidemann et al. 1992a; Brazill-Boast et al. 2010). Birds often rely on feeding habitat located within or immediately adjacent to breeding habitats (Brazill-Boast and Pryke 2011), however they will move up to 5 km (or potentially further) to find suitable feeding grounds. Key species of grass utilised during the breeding season, are annual spear grass or native Sorghum (e.g. *Sorghum stipoideum*, *S. intrans, S. plumosum*) and Spinifex (e.g. *Triodia bitextura; T. acutispicula; T. bynoei; T. schinzii*) (Dostine et al. 2001).

1.2.2 Non-breeding Habitat

Because of limited seed availability following a breeding season (July-January), Gouldian finches usually move away from their breeding habitats and form mixed species flocks, moving over lowland granite soil areas feeding on a range of annual and perennial grasses species. Key species of grass during this period includes kangaroo grass (*Themeda triandra*), cockatoo grass (*Alloteropsis semialata*), giant spear grass (*Heteropogon triticeus*), golden beard grass (*Chrysopogon fallax*), white grass (*Sehima nervosum*), ricegrass (*Xerochloa laniflora*), and Spinifex species (*Triodia spp).*

1.3 Key Threats

Several processes have been attributed to Gouldian finch declines (Tidemann 1996), including excessive trapping for aviculture (Franklin et al. 1999), infestation with airsac mite (Tidemann et al. 1992b), low survivorship (Woinarski and Tidemann 1992), inappropriate fire patterns (Dostine et al. 2001), mining activities (Garnett and Crowley 2000) and pastoral intensification (Franklin 1999; Franklin et al. 2005). However, the National Species Recovery Plan for the Gouldian finch specifically highlights that "habitat change through landscape destruction and inappropriate fire regimes are the factors most likely contributing to on-going declines or absence of recovery". Habitat destruction through landscape clearing and inappropriate fire management alters seed diversity, directly affecting foraging ecology and survival (Dostine et al. 2001), and also affects the availability and production of tree cavities, directly affecting breeding ecology and local recruitment (Brazill-Boast et al. 2010; Brazill-Boast et al. 2011).

The Ord Phase Two Expansion Project requires large areas of land clearing for irrigated agricultural land and the addition of infrastructure for secondary roads, irrigation, flood protection and drainage. Approximately 9260 ha vegetation for farms and infrastructure has been cleared, including approximately 8205 ha for farmland. As required by the State Approval of the Project, on the ranges and rocky slopes surrounding and within the proposed Development Area, a designated Buffer Area of approximately 11, 470 ha of native vegetation has been set aside to protect watercourses and surrounding conservation reserves, and help offset disturbance in the Development Area.

1.3.1 Food Availability

Both *Alloteropsis* and *Triodia* species, which are critical Gouldian finch wet season grass species, are highly vulnerable to anthropogenic habitat changes such as land clearing, grazing, and inappropriate fire regimes (O'Malley 2006). *Triodia* is highly flammable and particularly sensitive to repeated, late season wildfires, while *Alloteropsis* is susceptible to pastoralism and suffers reduced seed production for years after even moderate grazing pressure (Crowley and Garnett 2001).

Over the course of the tropical dry season, the availability of the Gouldian finch preferred grass seeds on the soil surface are steadily reduced by wind, rainfall run-off, fire, germination, and consumption and the birds typically move from their breeding habitats to low-lying areas to feed on wet-season seeding grasses (feeding on a variety of annual

and perennial grasses that produce seed at the appropriate times, in order to bridge this bottleneck in food supply (Dostine et al. 2001)). Therefore, the low-lying feeding areas and proposed Buffer Areas are critical for sustaining wet season grass productivity, and hence populations of non-breeding birds.

1.4 Weaber Plain Development Area and Gouldian Finches

Areas of breeding and non-breeding Gouldian finch habitat exist within the Weaber Plain Development Area, the Pincombe Range Conservation Area and Point Springs Nature Reserve, as well as within the Buffer Area to be established for the Weaber Plain Development Project.

The Gouldian finch has been recorded within the Ord-East Expansion Area prior to development. A preliminary survey during the non-breeding season of 2010 identified the presence of suitable breeding habitat (Pryke 2010). Additional in-depth surveys during the breeding season of 2011 (March-June) located 5 distinct breeding populations all of which were located within these habitats. During breeding surveys, Gouldian finches were also sighted feeding on *Sarga* species within the breeding habitats.

Gouldian finches have also been located within the Weaber Plain Development Area during the non-breeding season. In August 2010, birds were observed during general bird surveys (by Animal Plants Minerals). Furthermore, during in-depth surveys in 2011, birds were located in both the Buffer Area and the Development Area (Save The Gouldian Fund, 2011b). In contrast, in 2012, during the initial land-clearing phase, no Gouldian finches were sighted in either the Buffer or Development Areas (Save The Gouldian Fund 2013). However, since land clearing has been completed, 14 Gouldian finches were sighted in the Buffer Areas during the late dry season surveys in 2013 (Save The Gouldian Fund 2014), 29 in 2014 (Save The Gouldian Fund 2014) and a record high of 38 and 33 in 2015 and 2016, respectively (Save The Gouldian Fund 2015; Save The Gouldian Fund 2016).

In response to the presence of Gouldian finches in the area, the Gouldian Finch Management Plan (GFMP) has been developed (Strategen 2011). The purpose of the GFMP is to ensure the protection of the endangered Gouldian finch by preserving and maintaining habitat and ensuring the retention of vegetation corridors linking feeding areas across the Project.

1.5 Purpose of the Current Survey

To ensure protection and aid in the sustainable management of Gouldian finch populations within the Weaber Plain Development Area, the presence, distribution and relative numbers of Gouldian finches, as well as the quality and availability of their habitat and feeding grounds needs to be regularly monitored and assessed.

There are a number of potential impacts arising from the proposed project that need to be assessed during on-going monitoring. In the Development Area, the primary impacts have been the clearing of potential feeding habitat and the removal of feeding grasses (replaced with uninhabitable agricultural land). In the Buffer Area, the primary impacts are wildfire control and cattle grazing (both remove favourable feeding grasses required by Gouldian finches).

In response to the requirements for State approval under the EPBC Act and the GFMP this work aims to specifically address:

(A) EPBC Act (Condition 6AIV) and GFMP Monitoring Regime (Table 3, Item 4, 5):

Annual monitoring of the phenology and productivity of wet season feeding habitat, and assessment of their use by Gouldian Finches.

(B) GFMP Monitoring Regime (Table 3, Item 9):

Undertake assessment of vegetation condition in areas identified as key Gouldian Finch habitat within the Buffer Area and immediate surrounding reserves.

2 Methods

2.1 Study Site

The Weaber Plain Development Area and Buffer Area of the Ord-East Expansion Project is situated within the East Kimberley region of Western Australia. The area is located 30 km north-east of Kununurra on the Weaber Plains Road and approximately 100 km east of Wyndham. Gouldian finch associated habitat surveys are conducted in areas that have previously been identified as potential feeding (non-breeding) habitats, and in feeding areas within and adjacent to the breeding areas (Pryke 2010b; Save The Gouldian Fund 2011b), as well as in the Buffer Area (within the designated development area).

2.2 Feeding Grasses Transect Site Selection

Within the Buffer Area (both adjacent and within the designated Development Area), 41 permanent 50 x 50 meter square vegetation transects have been aligned to best represent the grass species present in known Gouldian finch feeding and breeding areas, as well as in the general Buffer Area (Table 1). This design is a variation of the Woinarski et al. (2010) quadrant, generally used for biodiversity surveys. These survey plots (50 x 50 metre squares) are placed at a minimum of 100 metres apart (i.e. areas of different sizes have different numbers of transects). In addition, the location of transects takes into account altitude differences in the area and ensures that transect surveying encompasses spatial/geographical differences in grass species ecology.

Table 1. Areas and number of surveyed vegetation transects (breeding area numbers.

Area	Number of transects
1 (breeding area with adjoining feeding areas)	4
2 (breeding area with adjoining feeding areas)	4
3 (breeding area with adjoining feeding areas)	3
4 (breeding area with adjoining feeding areas)	4
5 (breeding area with adjoining feeding areas)	6
Feeding Areas (all situated in the Buffer area)	14
Buffer Area corridors (within Development Area)	6

Although in the EPBC requirements, item 6A, condition IV states that the phenology and availability of grasses needs to be monitored during the wet season, these proposed surveys are undertaken during both wet and dry seasons. This is to be able to fully assess the availability and phenology (e.g. flowering times and seeding) of the different grass species in both the non-breeding and breeding stages, and assess grass quality in relation to current and future management regimes (e.g. fire and cattle management).

2.2.1 Grass Survey Transect Alignment

The start of the vegetation transect was marked with an individually numbered aluminium picket and marked with GPS coordinates. A 50-metre tape was placed in a straight line from the start point/picket and GPS coordinates were taken at the end of the 50-metre transect (again marked with a picket), and transect orientation noted (Figure 1). A photo was taken from the start point of all transects along the direction/orientation of each transect. For each transect, three 1 x 1 metre squares (located at (0 – 1 metre), (25 – 26 metre) and (49 – 50 metre)) were intensively surveyed for more detailed phenology assessment of individual grasses.

2.2.2 Phenology Assessment of Critical Grasses

Focusing on the line directly under the 50 meter tape, a measurement (in cm) was taken of the area occupied by any of the critical grass species for Gouldian finches: *Sarga* species, *Trioda* species (spinifex), *Chrysopogon fallax* (golden beard grass), *Alloteropsis semialata* (cockatoo grass), *Themeda triandra* (kangaroo grass), *Heteropogon triticeus* (giant spear grass), *Panicum decompositum* (native millet), *Xerochloa laniflora* (rice grass), and *Sehima nervosa* (white grass). At the completion of the 50-metre transect, measurements were totalled and converted into a percentage value. Within the 50-metre x 50-metre survey plot, grasses were individually marked to assess grass phenology over time (e.g. flowering, seeding).

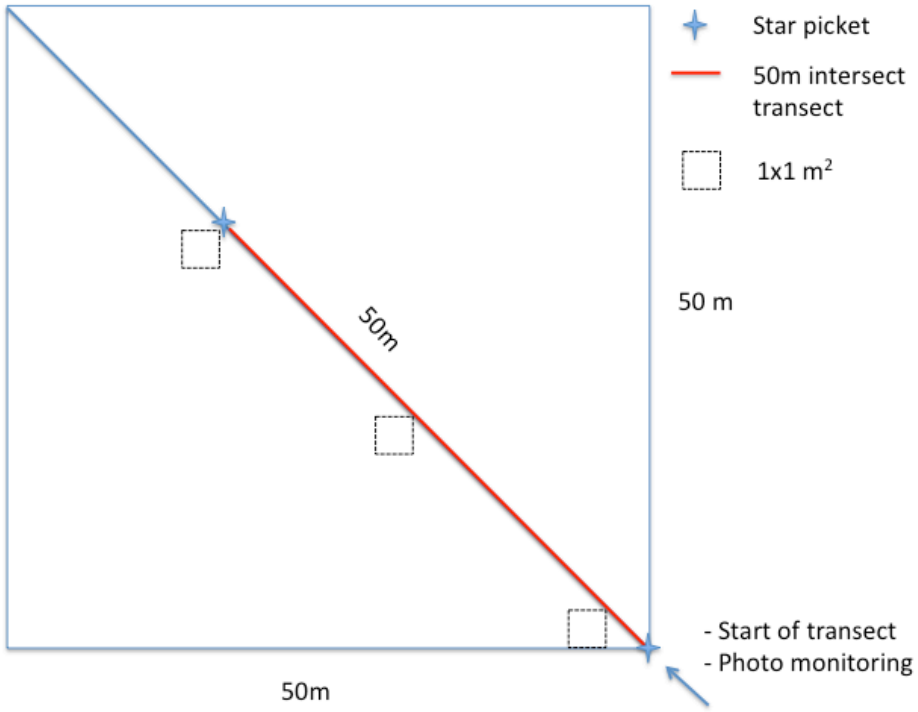

Figure 1. Schematic of the outlay of the 50 x 50 metre grass survey transect, depicting start and end of transect, orientation of photo monitoring and position of 1 x 1 meter squares.

2.2.3 Scoring of Additional Indicators Affecting Critical Grasses

In addition to grass quality and quantity, evidence of fire (i.e. burnt areas) and cattle damage (i.e. grazing, trampling) was scored. Scoring was measured by its direct effect on the availability and distribution of critical feeding grasses (none, patchy, low, moderate, high and extreme) in the 50 x 50 meter quadrant.

3 Results

3.1 Critical Feeding Grasses and Fire and Cattle Damage

A total of 38 vegetation surveys (transects located throughout the breeding, feeding and general Buffer area) were performed to infer availability and phenology of critical feeding grasses. Three transects (of the 41) could not be accessed due to heavy rainfall in the area.

No fires (or fire damage) were recorded in any of the surveyed areas between September 2016 and April 2017.

There was no cattle grazing damage observed and no cattle were sighted when surveying the area (Fig. 2). Compared to previous years, there was no evidence of low, patchy high or extreme grazing pressures were located in any of the surveys and habitats.

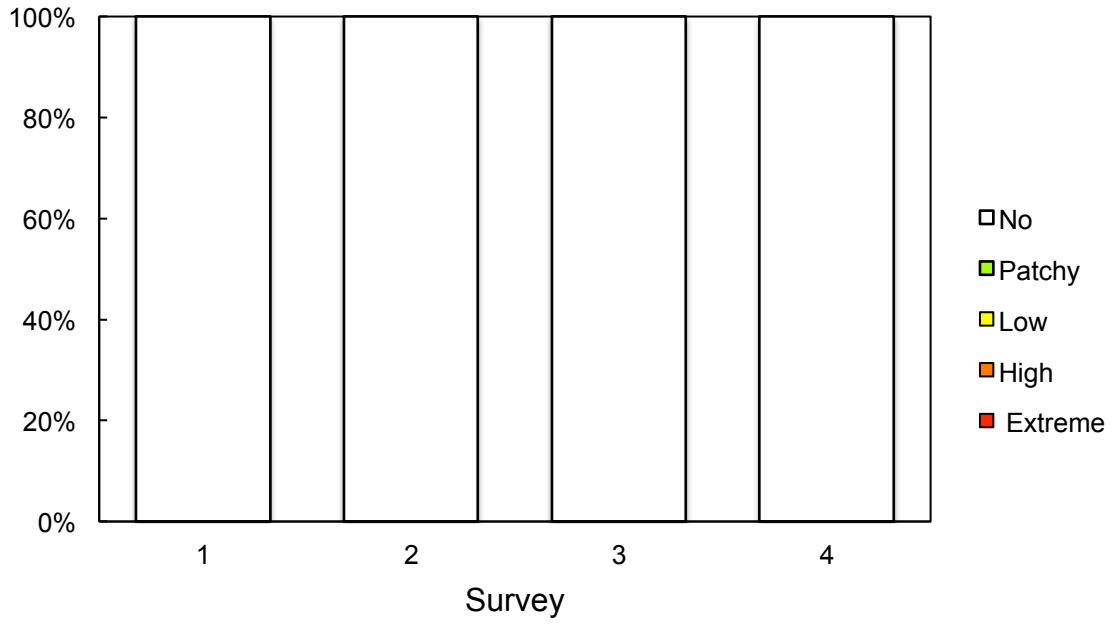

Figure 2. Percentage of vegetation transects showing the intensity of grazing damage observed at the different survey times (1 = October; 2 = December; 3 = February; 4 = April).

The severity of grazing pressure has substantially decreased compared to previous surveys (Table 2).

Table 2. Comparison of vegetation transects showing grazing damage observed during 2016-2017 surveys (average %).

Score	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017
None	4.9	56.2	83.5	84.7	0
Low	18.3	5.4	3.4	3.2	0
Patchy	12.2	36.9	13.1	12.1	0
High	18.3	1.5	0	0	0
Extreme	46.3	0	0	0	0

3.2 Availability and Presence of Feeding Grasses

Vegetation surveys in October and December 2016 (Table 4) showed that sorghum (e.g. *Sarga* spp.) were the prevalent feeding grasses available (53-86%) followed by spinifex (e.g. *Triodia* spp.), kangaroo grass (*Themeda triandra*), spear grass (*Heteropogon triticeus*), cockatoo grass (*Alloteropsis semialata*), golden beard grass (*Chrysopogon fallax*) and native millet (*Panicum decompositum*). These grasses comprise seven out of the nine commonly used seeding grasses used by the Gouldian finches in the eastern Kimberley.

Table 3. Available feeding grasses used by Gouldian finches in vegetation transects during late wet season surveys.

Year 2015	Vegetation cover (m)		% Critical Feeding Grasses Available	
Critical Feeding Grasses	**October**	**December**	**October**	**December**
Sorghum spp.	453.5	426.3	86.1	53.4
Triodia spp.	76.4	184.3	11.2	26.5
Themeda triandra	16.5	4.5	1.3	10.3
Alloteropsis semialata	59.4	9.4	0.4	3.7
Heteropogon triticeus	19.5	54.3	0.5	4.5
Panicum decompositum	6.7	6.4	0.2	0.8
Chrysopogon fallax	64.5	28.7	0.3	0.8

3.3 Phenology of Feeding Grasses

No grasses were flowering or seeding during the October and December surveys. During survey 3 (February), 89% of surveyed transects had flowering grasses, and in 34% of these transects grasses were producing seeds. In the final survey (April 2017), 36% of transects had flowering reassess and 28% of these were producing seeds. Table 5 details the phenology of the critical grass species observed in the vegetation transects during the wet season 2017.

Table 4. Percentage (%) of flowering and seeding grass species observed between February and April 2017

	% Flowering		% Seeding	
Critical Feeding Grasses	**February**	**April**	**February**	**April**
Sorghum/Sarga spp.	63.2	8.7	89.4	78.5
Triodia spp.	34.5	18.5	24.5	64.5
Themeda triandra	4.5	2.6	0	6.7
Alloteropsis semialata	18.4	9.6	7.6	3.6
Heteropogon triticeus	9.4	7.3	0	0
Panicum decompositum	6.7	0	0	0
Chrysopogon fallax	3.6	0	0.5	1.2

4 Discussion and Implications

As part of the Gouldian Finch Management Plan (Strategen 2012) and as a requirement for State approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), regular assessments of Gouldian finch populations and their associated habitats (breeding and feeding areas) are to be carried out during the construction and operation of the Ord River Irrigation Area Weaber Plain Development Project in the Eastern Kimberly. In concurrence with these conditions, this report summarises data for the wet season vegetation surveys, which specifically monitored the presence, condition and phenology of wet season feeding habitat and the critical feeding grasses used by Gouldian finches.

4.1 Assessment of Critical Wet Season Feeding Grasses

In contrast to earlier years (e.g. 2012-2013, where there was substantial fire damage and extreme cattle damage), the past four surveys (2013-2014, 2014-2015, 2015-2016, 2016-2017) have reported no evidence of fire damage in any areas. Furthermore, although the previous four seasons have shown some evidence of cattle damage (e.g. 'low' or 'patchy' grazing pressure), there was no evidence of any cattle damage during the 2016-2017 wet season.

Similar to previous years, surveys during 2016-2017 wet season showed that *Sarga* spp. and *Triodia* spp. were the most abundant feeding grasses present in the Gouldian finch breeding and feeding habitats. In particular, the Sarga *spp*. (sorghum) dominated, often making up between 67-89% of the grasses available to Gouldian finches. Sarga species are also the most common seeding grass available to Gouldian finches in other nearby localities. Another 5 grasses (including the grazing-sensitive *Alloteropsis*) used by Gouldian finches were also located, albeit in much lower densities.

Detailed phenology assessments of the Gouldian finch feeding grasses revealed that *Sorghum spp*. and *Triodia spp*. were the most prominent grass species observed flowering and seeding in the areas. In contrast, the grazing-sensitive *Alloteropsis semialata* and *Heteropogon triticeus* were much less common, and few of these plants were observed seeding.

The number and density of seeding grasses recorded for this season was much higher than in previous years (2012-2015). For example, in February 2017 89% of the critical feeding grasses were flowering, whereas in January 2016 only 67% were. This is likely a result of the well above average rainfall received during the 2016-2017 wet season compared to previous years. During this wet season, the Ord Area received more than double the normal long-term average of rain (around 900mmm compared to 420mm; Bureau of Meteorology, BOM 2017). This is likely to have directly promoted the higher densities of flowering and seeding grasses in the area, and may consequently indirectly positively affect the densities and distribution of Gouldian finches later in the year.

4.4 Implications and Future Management

The Gouldian Finch Management Plan (Strategen 2011) details strategies aiming to protect the populations of Gouldian finches and their associated habitats during development of the Ord River Irrigation Area - Weaber Plain Development Project. Prominent in the Gouldian Finch Management Plan is the implementation of a fire management plan (aimed at reducing the incidence of late season wildfires), and removal of cattle in the Project area to prevent extreme grazing pressures. In addition, the Gouldian Finch Management Plan aims to protect Gouldian finch populations by preserving and maintaining habitat by ensuring the retention of corridors linking feeding areas across the Project.

The work from this survey (assessing the critical feeding grass availability and phenology) highlights the importance of implementing the Gouldian Finch Management Plan together with the Fire Management Plan and the Buffer Management Plan. Removing cattle, as stated in the Buffer Management Plan (Strategen 2011), together with the Fire Management Plan (Strategen 2011), has substantially increased the availability and productivity of the Gouldian finch seeding grasses, and Gouldian finches have also returned to the area. The GFMP aims to protect Gouldian finch populations by preserving and maintaining habitat (reduce grazing pressure and incidences of wild fires) and ensuring the retention of corridors linking feeding areas across the Project. Surveys of Gouldian finches in the last few years (following wildfire control and cattle management) have shown steady increases in their numbers (Save The Gouldian Fund 2016b), both in the breeding areas and also in the non-breeding areas during the wet season. The higher than average rainfall (Bureau of Meteorology, BOM 2017), together with the higher densities of flowering and seeing grasses recorded this year is likely to

positively affect the densities and productivity of Gouldian finches in the area this season. Future surveys will be able to quantify this.

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