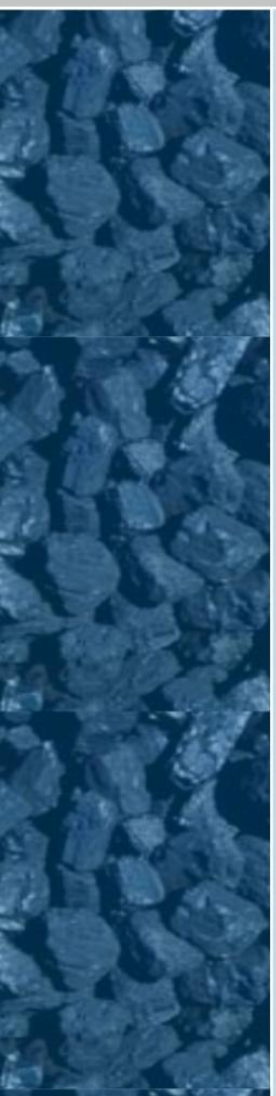
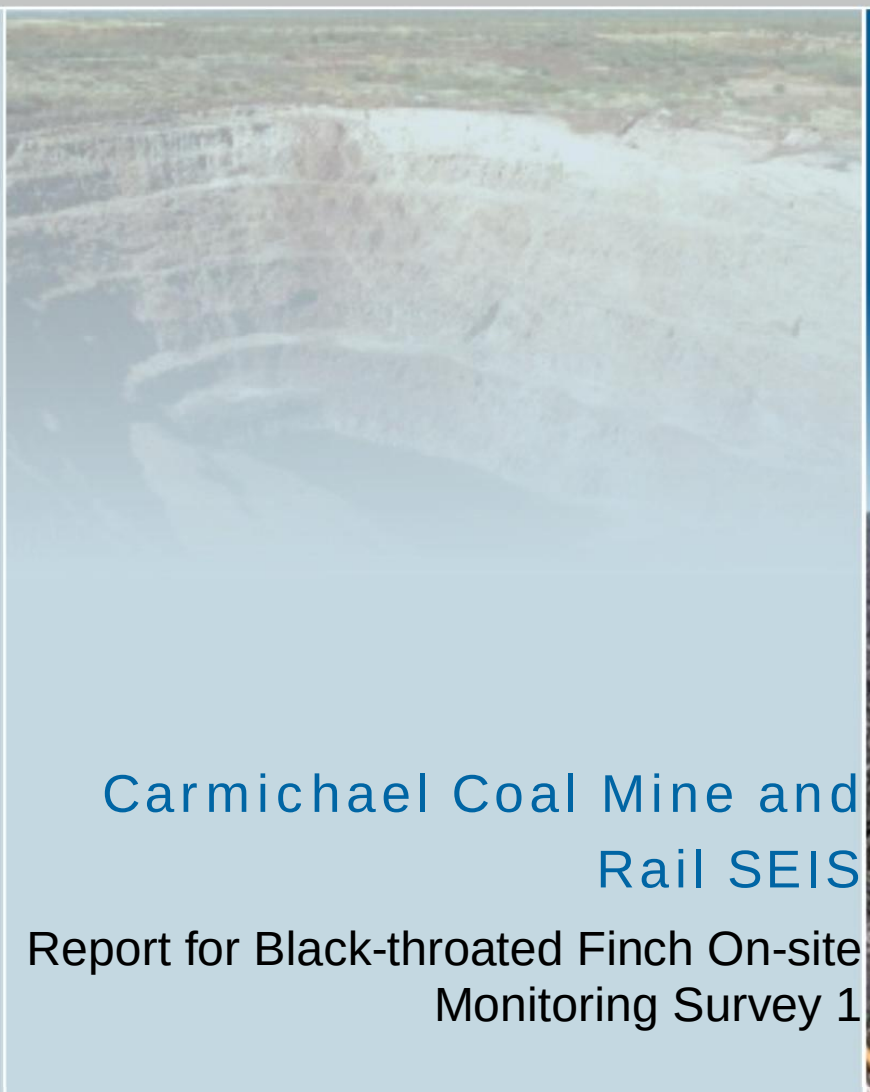
Adani Mining Pty Ltd





Carmichael Coal Mine and Rail SEIS

Report for Black-throated Finch On-site Monitoring Survey 1

17 October 2013

This Carmichael Coal Mine and Rail Project SEIS: Black-throated Finch On-site Monitoring Survey 1 (the Report) has been prepared by GHD Pty Ltd (GHD) on behalf of and for Adani Mining Pty Ltd (Adani) in accordance with an agreement between GHD and Adani.

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The Report is based on conditions encountered and information reviewed, including assumptions made by GHD, at the time of preparing the Report.

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1. Introduction

1.1 Project overview

Adani Mining Pty Ltd (Adani, the Proponent), commenced an Environmental Impact Statement (EIS) process for the Carmichael Coal Mine and Rail Project (the Project) in 2010. On 26 November 2010, the Queensland (Qld) Office of the Coordinator General declared the Project a 'significant project' and the Project was referred to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) (referral No. 2010/5736). The Project was assessed to be a controlled action on the 6 January 2011 under section 75 and section 87 of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The controlling provisions for the Project include:

- World Heritage properties (sections 12 & 15A)
- National Heritage places (sections 15B & 15C)
- Wetlands (Ramsar) (sections 16 & 17B)
- Listed threatened species and communities (sections 18 & 18A)
- Listed migratory species (sections 20 & 20A)
- Great Barrier Reef Marine Park (GBRMP) (sections 24B & 24C)
- Protection of water resources (sections 24D & 24E)

The Qld Government's EIS process has been accredited for the assessment under Part 8 of the EPBC Act in accordance with the bilateral agreement between the Commonwealth of Australia and the State of Queensland.

The Proponent prepared an EIS in accordance with the Terms of Reference (ToR) issued by the Qld Coordinator-General in May 2011 (Qld Government, 2011). The EIS process is managed under section 26(1) (a) of the *State Development and Public Works Act 1971* (SDPWO Act), which is administered by the Qld Government's Department of State Development, Infrastructure and Planning (DSDIP).

The EIS, submitted in December 2012, assessed the environmental, social and economic impacts associated with developing a 60 million tonne (product) per annum (Mtpa) thermal coal mine in the northern Galilee Basin, approximately 160 kilometres (km) north-west of Clermont, Central Queensland, Australia. Coal from the Project will be transported by rail to the existing Goonyella and Newlands rail systems, operated by Aurizon Operations Limited (Aurizon). The coal will be exported via the Port of Hay Point and the Point of Abbot Point over the 60 year (90 years in the EIS) mine life.

Project components are as follows:

- The Project (Mine): a greenfield coal mine over EPC 1690 and the eastern portion of EPC 1080, which includes both open cut and underground mining, on mine infrastructure and associated mine processing facilities (the Mine) and the Mine (offsite) infrastructure including a workers accommodation village and associated facilities, a permanent airport site, an industrial area and water supply infrastructure

- The Project (Rail): a greenfield rail line connecting to mine to the existing Goonyella and Newlands rail systems to provide for the export of coal via the Port of Hay Point (Dudgeon Point expansion) and the Port of Abbot Point, respectively including:
  - Rail (west): a 120 km dual gauge portion running west from the Mine site east to Diamond Creek
  - Rail (east): a 69 km narrow gauge portion running east from Diamond Creek connecting to the Goonyella rail system south of Moranbah.
  - Quarries: The use of five local quarries to extract quarry materials for construction and operational purposes.

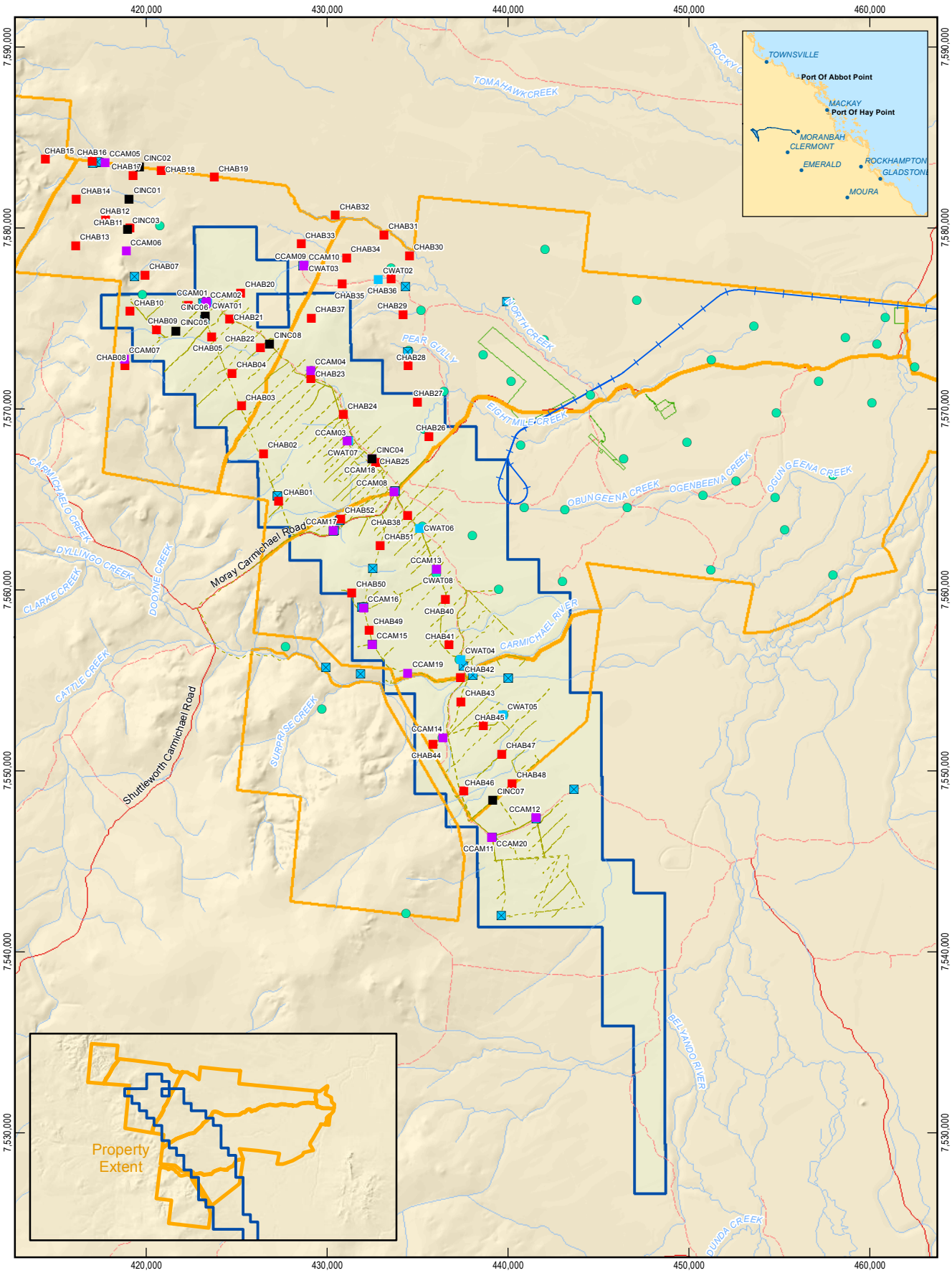
1.2 Previous work

The black-throated finch (southern) is listed as endangered under the EPBC Act and as endangered under the *Nature Conservation Act 1992* (Qld) (NC Act). Previous terrestrial ecological surveys conducted by GHD (2011, 2012) as part of the Project EIS and subsequently by Ecology and Heritage Partners Pty Ltd (unpublished data, 2012) identified large numbers of the black-throated finch (southern) (*Poephila cincta cincta*) (black-throated finch) on the proposed Mine site and opportunistically within the broader Moray Downs property adjacent to the Mine site.

In discussion with the DSEWPaC and the Black-throated Finch Recovery Team, Adani committed to the development and implementation of an additional monitoring program, to gain a better understanding of the population size, seasonal movements and key habitats and potential nesting areas used by the black-throated finch, both at the Mine site and adjacent Moray Downs and Bygana properties.

1.3 Study area

The Study Area comprises the Mine site and adjacent Moray Downs and Bygana properties. Figure 1 shows the Study Area and all two hectares (ha), water body and camera trap locations.



LEGEND

Survey Sites
- 2ha
- Camera
- Incidental
- Water
- Past Surveys (Waterbodies)
- Indicative Dams
- Tracks (GPS)
- Watercourse
- Minor Road
- Track
- Existing Rail Network
- Goonyella System
- Newlands System
- Moray Downs Property
- Project (Mine)
- Mine (Offsite)
- Project (Rail)

1:300,000 (at A4)

0 2 4 6 8 10

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

Adani Mining Pty Ltd
Carmichael Coal Mine and Rail Project SEIS

Job Number 41-26422
Revision B
Date 11-10-2013

Black-Throated Finch Monitoring

Figure 1

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Level 9, 145 Ann St Brisbane QLD 4000 T +61 7 3316 3000 F +61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data Source: GA: Road, River / Watercourse (2007); DME:EPC1690 (2010), EPC1080 (2011); GHD: Survey Sites(2013) Adani: Indicative Dams, Past Survey Waterbodies, GPS Tracks, Offsite Infrastructure, Alignment(2013). Created by: MS

1.4 Purpose

The purpose of this report is to present the results of the first phase of targeted black-throated finch monitoring undertaken in the Study Area. The intent of this monitoring was to stratify and mark a series of permanent 2 ha plots across the Study Area, as well as identify and survey water bodies via observation and camera traps. These methods are described in more detail in Section 2. This monitoring program is a component of a larger adaptive monitoring and management program and will collect more detailed data on:

- Habitat preferences, local habitat use (i.e. hotspots), preferred habitat structure and vegetation composition, diet, nesting sites and reliance on mixed species flocks
- Temporal variation in habitat use
- Coarse population estimates and any spatial and temporal variation in numbers
- Response to existing land management effects (i.e. grazing, fire, weeds, water array)

The data collected will be used to manage the species within the Study Area during the construction and development phases of the Project and over the life of the mine. The monitoring program was developed in consultation with the Black-throated Finch Recovery Team and DSEWPaC during meetings held on the 3 May 2013 and 7 June 2013 respectively.

2. Methods

2.1 Field assessment

The surveys reported herein were undertaken over the period 23 – 31 May 2013, coinciding with the recommended wet season survey period for the black-throated finch in areas north of latitude 23° (DEWHA, 2009a, b). Four fauna ecologists with experience in vegetation surveys participated in the surveys.

A combination of three survey methods were employed based on the recommendations within the Significant Impact Guidelines for the black-throated finch (southern) *Poephila cincta cincta* (DEWHA, 2009a, b); water body watches; area counts; and remote fauna cameras. Where black-throated finch were encountered the following recommended observation data was collected (DEWHA, 2009a, b); the number observed, the number of adults and juveniles, observations on feeding, drinking, perching, preening, begging by young, flighting, nesting and mating.

2.2 Site stratification

Prior to the establishment of the monitoring sites, the Study Area was stratified via vegetation type, level of vegetation disturbance, elevation and distance to water, all of which are considered to influence the presence or absence of black-throated finch regionally (Black-Throated Finch Recovery Team, 2007; DEWHA, 2009a, b) and in the study area (GHD, 2011, 2012). Initial mapping of the study area to stratify and select the monitoring sites identified;

- Areas < 1 km and > 1 km from water (artificial and natural)
- Elevation >250 m and < 250 m
- Remnant and non-remnant vegetation
- Suitable and not suitable black-throated finch habitat (based on known use at the site and elsewhere)

The intent was not just to target known suitable habitat for the black-throated finch but to monitoring a range of sites to understand the spatial variation of habitat use over time, and whether there were areas that are used more consistently than others, and therefore requiring targeted management.

The selection of water bodies to undertake counts and establish camera traps was undertaken via reference to locations where black-throated finch were previously recorded, and detailed water body mapping provided by Adani. However as black-throated finch also use small ephemeral watering areas (often in scrapes and drainage lines) it was expected that many of the sites chosen to observe or camera trap would be undertaken on an *ad hoc* basis, once the survey commenced.

2.3 Water body counts

Eight large water bodies were chosen for water body counts to target black-throated finch (Table 1). Watches were conducted by at least two people and up to four, and included at least one person watching for the full duration of the watch and one person surveying the surrounding

habitat (600 m radius of water source) as recommended by the significant impact survey guidelines (DEWHA, 2009a). Locations are mapped in Figure 1.

Table 1 Location of water body counts

Site	Month	Year	Name	Type	Region	East	North
CWAT01	May	2013	10 Mile Bore	Large Dam	55K	423382	7575879
CWAT02	May	2013	16 Mile Tank	Large Dam	55K	432833	7577157
CWAT03	May	2013	10 Mile Tank	Large Dam	55K	428716	7577948
CWAT04	May	2013	Swamp Tank	Large Dam	55K	437386	7556168
CWAT05	May	2013	Bushy's Dam	Large Dam	55K	439715	7553076
CWAT06	May	2013	Matheson's Dam	Large Dam	55K	435107	7563409
CWAT07	May	2013	10 Mile Dam (#1 Dam)	Large Dam	55K	431186	7568219
CWAT08	May	2013	Four Mile Dam	Large Dam	55K	436019	7561136

2.4 Two hectare searches

A total of 52 x 2 ha woodland habitat survey sites were identified and permanently marked. At each of these sites, 2 x 20 minute two bird counts were undertaken, recording all bird species encountered (seen or heard), abundance and whether they were operating in a mixed flock (sensu Vanderduys et al., 2012). These standardised bird counts follow the method recommended by Bird Life Australia (Barrett et al., 2003). The two bird surveys at each site were undertaken throughout the day; however, efforts were made to ensure that each site was surveyed at least once in the premium survey period between dawn and 3 hours after dawn. The location and description of these sites is presented in Table 2 and the locations are mapped in Figure 1.

2.5 Camera traps

Twenty cameras (ScoutGard SG560Z-8M) were installed at a range of different water bodies, including large dams, troughs, puddles near leaking tanks, road scrapes and ephemeral drainage lines. All were set by the week ending 31 May 2013 and were collected in the week ending 27 June 2013. Cameras were installed at water sources where easy access to watering points was available for black-throated finches (southern), (e.g. banks flat and with sparse vegetation and shallow water). Vegetation was removed from in front of the lens, to avoid the system being triggered by vegetation in the wind. After collection, cameras where brought back and the images were downloaded for viewing. The location and description of the camera traps sites is presented in Table 3 and the locations are mapped in Figure 1.

2.6 Incidental black-throated finch sightings

Where black-throated finch were encountered incidentally (outside of the standardised survey methods identified above), the accurate location of the sighting was recorded via GPS, including other bird species present and black-throated finch specific data as outlined in Section 2.1. Intersection of these sites with environmental spatial layers via GIS will provide supplementary landscape data regarding vegetation type, distance from water and elevation.

Table 2 Location of the 2 ha monitoring sites and their landscape characteristics

Site name	Direction	Location	Easting	Northing	RE	Elevation	Dist water	Description
CHAB01	E	EPC	427319.5	7564911.5	10.5.1d	277.7	527.4	*Eucalyptus whitei* or *E. similis* on sand sheets.
CHAB02	S	EPC	426469.6	7567541.3	10.5.5a	279.4	334.9	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB03	E	EPC	425249.2	7570166.2	10.5.1d	285.0	1966.1	*Eucalyptus whitei* or *E. similis* on sand sheets.
CHAB04	S	EPC	424738.1	7571955.4	10.5.5a	283.4	1309.3	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB05	W	EPC	423618.1	7573979.8	10.3.28a	288.0	436.8	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB06	S	EPC	422324.8	7575722.9	10.5.5a	298.5	1326.3	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB07	N	Moray	419923.4	7577402.6	10.5.5a	324.1	179.4	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB08	E	Moray	418803.7	7572371.1	10.5.5a	317.2	1260.7	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB09	W	EPC	420566.8	7574366.6	10.5.5a	304.3	177.0	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB10	E	EPC	419077.5	7575395.6	10.5.1a	328.5	993.4	*Eucalyptus whitei* or *E. similis* on sand sheets.
CHAB11	S	Moray	419079.0	7580025.9	10.7.11a	318.9	1409.3	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB12	S	Moray	417749.8	7580444.7	10.5.1a	319.8	1643.5	*Eucalyptus whitei* or *E. similis* on sand sheets.
CHAB13	W	Moray	416092.8	7579010.5	10.5.5a	363.3	1861.7	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB14	E	Moray	416121.0	7581590.0	10.7.11a	340.2	848.5	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB15	W	Moray	414414.1	7583803.6	10.5.10	347.1	47.0	Dry woodlands to open-woodlands, dominated by bloodwoods or ironbarks
CHAB16	S	Moray	417001.8	7583684.4	10.7.11a	323.5	91.4	*Eucalyptus melanophloia* woodlands to open-woodlands

Site name	Direction	Location	Easting	Northing	RE	Elevation	Dist water	Description
CHAB17	W	Moray	419267.0	7582921.0	10.5.5a	308.2	1152.3	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB18	S	Moray	420810.0	7583191.0	10.5.5a	295.9	1549.9	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB19	S	Moray	423758.0	7582809.0	10.5.5a	281.0	3042.1	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB20	N	EPC	425217.5	7576417.7	10.5.5a	276.5	1390.5	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB21	S	EPC	424594.1	7574981.7	10.3.28a	281.5	1145.0	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB22	E	EPC	426312.4	7573408.2	10.5.5a	274.7	370.4	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB23	S	EPC	429102.9	7571664.6	10.3.28a	261.6	349.3	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB24	S	EPC	430891.3	7569686.7	10.3.28a	250.2	7.3	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB25	S	EPC	432665.1	7567048.8	10.4.5	241.0	97.1	*Acacia cambagei* or *A. georginae* or *A. argyrodendron* open forests
CHAB26	E	EPC	435623.8	7568478.6	Nonrem	237.3	592.3	Non-remnant
CHAB27	E	EPC	434980.3	7570378.9	Nonrem	234.1	655.5	Non-remnant
CHAB28	E	Moray	434480.7	7572373.1	Nonrem	244.2	764.4	Non-remnant
CHAB29	E	Moray	434206.2	7575210.8	Nonrem	246.5	33.3	Non-remnant
CHAB30	W	Moray	434549.0	7578457.5	Nonrem	242.3	229.9	*Eucalyptus populnea* (or *E. brownii*) woodlands
CHAB31	S	Moray	433133.8	7579619.0	Nonrem	248.1	144.5	*Eucalyptus populnea* (or *E. brownii*) woodlands
CHAB32	S	Moray	430444.3	7580697.7	Nonrem	254.5	222.1	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB33	W	Moray	428551.6	7579130.3	Nonrem	259.7	283.7	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB34	N	Moray	431071.0	7578350.0	Nonrem	251.1	18.0	Non-remnant

Site name	Direction	Location	Easting	Northing	RE	Elevation	Dist water	Description
CHAB35	S	Moray	430826.2	7576903.9	Nonrem	257.4	20.1	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB36	S	Moray	433547.2	7577171.3	Nonrem	245.6	263.2	Non-remnant
CHAB37	S	EPC	429110.6	7575027.2	Nonrem	291.1	1868.9	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB38	W	EPC	434440.2	7564126.5	Nonrem	235.8	768.2	Non-remnant
CHAB39	N	EPC	436050.0	7561144.2	Nonrem	234.8	2168.8	Non-remnant
CHAB40	E	EPC	436538.8	7559460.8	Nonrem	242.5	1620.9	Non-remnant
CHAB41	N	EPC	436730.3	7556963.4	Nonrem	231.4	588.0	Non-remnant
CHAB42	W	EPC	437362.0	7555139.3	Nonrem	230.2	118.6	Non-remnant
CHAB43	E	EPC	437384.6	7553812.0	Nonrem	237.1	723.6	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB44	E	EPC	435846.2	7551470.6	Nonrem	261.5	719.0	Dry woodlands to open-woodlands, dominated by bloodwoods or ironbarks
CHAB45	S	EPC	438652.2	7552498.1	Nonrem	240.9	1279.7	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB46	W	EPC	437540.4	7548868.6	Nonrem	261.2	250.5	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB47	N	EPC	439645.3	7550939.8	Nonrem	241.2	203.2	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB48	N	EPC	440214.6	7549287.8	10.3.28a	243.9	668.0	*Eucalyptus melanophloia* woodlands to open-woodlands
CHAB49	W	EPC	432315.8	7557767.3	Nonrem	250.5	1483.3	Non-remnant
CHAB50	E	EPC	431362.9	7559818.5	10.5.1c	277.1	1455.7	*Eucalyptus whitei* or *E. similis* on sand sheets.
CHAB51	W	EPC	432916.5	7562441.5	Nonrem	261.6	530.1	Non-remnant
CHAB52	W	EPC	430734.3	7563922.1	10.3.28a	262.1	275.0	*Eucalyptus melanophloia* woodlands to open-woodlands

Table 3 Location of the camera traps

Site	Month	Year	Name	Type	East	North
CCAM01	May	2013	10 Mile Bore	Small Dam	423338	7575930
CCAM02	May	2013	10 Mile Bore	Ephemeral	423288	7575822
CCAM03	May	2013	10 Mile Dam (#1 Dam)	Large Dam	431097	7568215
CCAM04	May	2013	Dam #2	Large Dam	429082	7572104
CCAM05	May	2013	No name	Ephemeral	417715	7583613
CCAM06	May	2013	Tank near Langlands Bore	Ephemeral	418881	7578727
CCAM07	May	2013	Drainage line	Ephemeral	418787	7572769
CCAM08	May	2013	Labona Bore	Trough	433685	7565430
CCAM09	May	2013	10 Mile Tank	Large Dam	428713	7577946
CCAM10	May	2013	10 Mile Tank	Large Dam	428718	7577918
CCAM11	May	2013	Bygana	Ephemeral	439096	7546324
CCAM12	May	2013	Bygana	Trough	441533	7547414
CCAM13	May	2013	Four Mile Dam	Trough	436047	7561138
CCAM14	May	2013	Carmichael Bore	Trough	436402	7551819
CCAM15	May	2013	Humes Bore 1	Trough	432492	7556974
CCAM16	May	2013	Humes Bore 2	Trough	432012	7559007
CCAM17	May	2013	Drainage line	Ephemeral	430343	7563292
CCAM18	May	2013	Drainage line	Ephemeral	432472	7567250
CCAM19	May	2013	Bygana	Trough	434458	7555399
CCAM20	May	2013	Bygana	Trough	439097	7546321

2.7 Habitat assessment

At each 2 ha survey site, a habitat assessment was undertaken using methods based broadly on the Queensland BioCondition framework (Eyre et al., 2011) and the Queensland Herbarium flora survey methods (Neldner et al., 2005). At each site a 100 m transect was set centrally in the sample unit and marked at the 0 – 100 m points by a star picket. Each transect was set on a cardinal bearing to assist with relocation over time, and a site photo was taken as a reference. Four habitat components were measured.

1. Broad management effects. For the entire transect the following were estimated:
   - Wildfire (0 = <1 yr, 1 = 1 – 5 yr, 2 = >5 yr):
   - Grazing (0 = none to 3 = severe):
   - Weeds (0 = none to 3 = severe), Grazing definition: 0 = none, 1 = small amount from few plants, 2 = small to moderate amount from many plants, 3 = moderate to large amount from many plants
   - Erosion (0 = none to 3 = severe), Erosion definition: 0 = stable, 1 = slight disturbance (i.e. cattle tracks), 2 = moderate (pedestalling, sheet, rill), 3 = severe (pedestals, scalds, sand blown, exposure)

2. Ground cover. Within 5 x 1 m^2 plots located at the 0, 25, 50, 75, 100 m mark the following components were estimated and then averaged to give a mean score for the site:
   - Native perennial tussock grass, Native perennial hummock grass, Native perennial herbs/forbs (non-grass), Native annual grass, herbs and forbs, Native shrubs (< 1 m height)
   - Non-native grass, Non-native herbs and shrubs
   - Litter (woodies < 10 cm diameter, dead annual grasses, herbs and forbs), Litter (logs > 10 cm diameter)
   - Rock, Bare ground
3. Ground composition. Within 5 x 1 m^2 plots located at the 0, 25, 50, 75, 100 m mark the grounds cover species were recorded and their cover estimated. These scores were averaged to give a mean score for the site.
4. Tree and shrub canopy cover (estimate and 100 m line intercept). For the 100 m transect the following was recorded:
   - An estimate of the average height of each woody / tree strata (E = emergent, T1 = upper canopy, T2 = mid canopy, T3 = lower canopy, S = shrub)
   - An estimate of the crown cover of each woody / tree strata (E, T1, T2, T3, S) and species in a 10 x 100 m area
   - The line intercept total of the crown cover of each woody / tree strata (E, T1, T2, T3, S) and species
   - The average crown cover of each strata and species, as an average of the above two scores

2.8 Relational database

All data collected is stored in a relational database (Microsoft Access) for efficient storage and interrogation, so that subsequent survey data can be included and extracted efficiently. This database comprises of a number of components;

- All existing black-throated finch records from the Study Area from all previous surveys (GHD, 2011) and (EHP, 2012, unpublished data), including the current surveys
- The detailed 2 ha site survey bird and vegetation composition data from the 2012 surveys (GHD, 2012)
- The detailed 2 ha site survey bird and vegetation (composition and structure) data from the current 2013 surveys
- The current 2013 water body and camera trap survey data
- A flora and fauna dictionary

2.9 Data analysis

The variation in species composition in the bird assemblages and plant communities recorded at sites where the black-throated finch were recorded as present or absent, was examined via ordination using multi-dimensional scaling in the Primer package (Clarke and Gorley, 2006). Each site by species array was square-root transformed and a Bray Curtis dissimilarity matrix was created. The ordination used multidimensional scaling (MDS).

The variation in bird species abundance and plant cover between sites where black-throated finch were recorded was also examined by non-parametric Mann-Whitney-U tests (StatSoft Inc., 2011).

Plate 1 Camera trap on location on a trough where black-throated finches are drinking (May, 2013)

3. Results

3.1 Bird surveys

A total of 117 bird species were recorded over the current surveys; 92 species representing 32 families from the 2 ha counts and 80 species representing 39 families. The most abundant species recorded from the 2 ha counts were the budgerigar *Melopsittacus undulates* (n = 1544), weebill *Smicrornis brevirostris* (n = 272), red-backed fairy-wren *Malurus melanocephalus* (n = 213), plum-headed finch *Neochmia modesta* (n = 180), rufous whistler *Pachycephala rufiventris* (n = 116), black-throated finch (southern) *Poephila cincta cincta* (n = 101) and singing honeyeater *Lichenostomus virescens* (n = 98). The most abundant species recorded from the water body counts were the budgerigar (n = 636), the plum-headed finch (n = 241), the Australian wood duck *Chenonetta jubata* (n = 133) and the black-tailed native hen *Tribonyx ventralis* (n = 123) (Appendix A and B, Table 6).

In terms of effort, a total of 52 x 2 ha bird counts (n = 104 counts) were conducted twice by two ecologists; approximately 120 – 140 person hours of survey. In addition two vehicles were traversing the property and tracks for 8 days of survey and were vigilant for any incidental black-throated finch records. The water body counts comprised of 29.5 hours of watching (Table 5).

3.2 Black-throated finch records

A total of 208 black-throated finches were recorded from all surveys; 99 from 11 different 2 ha counts, 1 from a single water body counts and 108 from eight incidental records (Table 4). All were adult birds, and the most common observed activity was perching (n = 18 observations), feeding (n = 11), preening (n = 5) and nesting (n = 4). The largest group observed was at least 30 individuals (site CHAB08 and CINC05).

A further six black-throated finch sites were recorded from the camera traps (CCAM02, CCAM09, CCAM11, CCAM12, CCAM14, CCAM20), ranging from 1 to 89 separate photos of the bird and of a maximum recorded flock size from 1 – 41 individuals (Table 7). Four of the cameras that recorded black-throated finch were troughs, one was an ephemeral scrape and one was a large dam. The cameras were operating from between 22 to 42 days and collected between 5 and 9565 pictures per camera. This included between 1 and 913 pictures of fauna.

The nesting records are the first for the study area and were observed at CHAB05, CHAB09 and CHAB11. At CHAB05 an adult birds was observed *Panicum* sp stalks in its mouth suggesting nesting activity nearby; however the nests were not found. At CHAB09 at least two active nests being used by black-throated finch were found in *Acacia coriacea* (Plate 2). At CHAB11 an active nest being used by black-throated finch was found in *Eucalyptus melanophloia* (Plate 3).

Plate 2 Nest found in an *Acacia coriacea* (May, 2013)

Plate 3 Nest found in a *Eucalyptus melanophloia* (May, 2013)

Table 4 All black-throated finch (southern) records from the current monitoring

Site	Type	Date	East	North	Adults	Feed ?	Drink ?	Perch ?	Preen ?	Beg ?	Fight ?	Nest ?	Mate ?	Notes
CHAB05	2 ha	23/05/2013	423618	7573980	4	Yes		Yes				Yes		Adult carrying *Panicum* sp stalks in mouth and flew off. Suggests nesting activity nearby, but nests not found
CHAB06	2 ha	24/05/2013	422324	7575723	10	Yes		Yes						Feeding in mixed flock on *Schizachyrium fragile* and *Eriachne mucronata*
CHAB08	2 ha	24/05/2013	418803	7572371	30	Yes		Yes	Yes					
CHAB09	2 ha	23/05/2013	420535	7574335	1			Yes	Yes			Yes		Active nests being utilised black-throated finch were found in *Acacia coriacea*. At least two located.
CHAB11	2 ha	24/05/2013	419079	7580026	10			Yes				Yes		Active nests being used by black-throated finch were found in *Eucalyptus melanophloia*.
CHAB11	2 ha	28/05/2013			1	Yes		Yes				Yes		As above

Site	Type	Date	East	North	Adults	Feed ?	Drink ?	Perch ?	Preen ?	Beg ?	Fight ?	Nest ?	Mate ?	Notes
CHAB16	2 ha	31/05/2013	417001	7583684	1			Yes						On site on edge of ephemeral drainage line.
CHAB21	2 ha	27/05/2013	424594	7574982	8	Yes		Yes						
CHAB24	2 ha	23/05/2013	430891	7569687	18			Yes	Yes					
CHAB24	2 ha	24/05/2013			15	Yes		Yes	Yes					
CHAB32	2 ha	25/05/2013	430405	7580685	1			Yes						
CINC01	Incidental	24/05/2013	419047	7581609	19	Yes		Yes						Feeding in mixed flock banks of a dry *Eucalyptus camauldulensis* drainage line. *Triodia pungens, Eriachne mucronata, Alloteropsis semialata, Paspalidium* sp, and *Digitaria brownii* all seeding.
CINC02	Incidental	24/05/2013	419619	7583383	14	Yes		Yes						Flushed from side of track, perched then flew off.
CINC03	Incidental	24/05/2013	418975	7579951	24	Yes		Yes						
CINC04	Incidental	27/05/2013	432474	7567249	2									
CINC05	Incidental	27/05/2013	421639	7574289	30	Yes		Yes	Yes		Yes			
CINC06	Incidental	27/05/2013	423256	7575142	8	Yes		Yes						
CINC07	Incidental	26/05/2013	439156	7548379	8			Yes						
CINC08	Incidental	23/05/2013	426817	7573584	3									

Site	Type	Date	East	North	Adults	Feed ?	Drink ?	Perch ?	Preen ?	Beg ?	Fight ?	Nest ?	Mate ?	Notes
CWAT01	Water	23/05/2013	423382	7575879	1		Yes	Yes						Single adult at dam, flew off when spotted.
CCAM02	Camera - ephemeral	23/05/2013	423288.0	7575822.0	41		Yes							
CCAM09	Camera - large dam	25/05/2013	428713.0	7577946.0	1		Yes							
CCAM11	Camera - trough	29/05/2013	439096.2	7546323.6	3		Yes							
CCAM12	Camera - trough	29/05/2013	441533.8	7547414.4	10		Yes							
CCAM14	Camera - trough	26/05/2013	436402.0	7551819.0	11		Yes							
CCAM20	Camera - trough	29/05/2013	439097.0	7546320.7	2		Yes							

Table 5 Survey effort (hours) for each of the water body counts

SITE	DATE	10 Mile Bore	10 Mile Dam	10 Mile Tank	16 Mile Tank	Bushy's Dam	Four Mile Dam	Matheson's Dam	Swamp Tank
CWAT01	23/05/2013	4							
CWAT01	24/05/2013	2							
CWAT02	25/05/2013				1.5				
CWAT03	25/05/2013			4					
CWAT04	26/05/2013								1
CWAT04	28/05/2013								2
CWAT05	26/05/2013					3			
CWAT06	26/05/2013							2	
CWAT06	29/05/2013							2	
CWAT06	29/05/2013							2	
CWAT07	23/05/2013		2						
CWAT07	23/05/2013		2						
CWAT08	28/05/2013						2		
Total		6	4	4	1.5	3	2	6	3

Table 6 Bird species and abundance for the water body counts

Common name	CWAT01	CWAT02	CWAT03	CWAT04	CWAT05	CWAT06	CWAT07	CWAT08
emu	1							
brown quail						1		1
Australian wood duck				33		100		
Pacific black duck						8		
grey teal		1		4		33		2
pink-eared duck		1		1		38		
hardhead			1					
Australasian grebe						13		
Australasian darter				2				1
little pied cormorant			1					
little black cormorant						15		
white-faced heron						1		
white-necked heron		1				1		
straw-necked ibis						2		
royal spoonbill				1				
black-necked stork						1		
whistling kite			1	3	1	5	1	
spotted harrier						1		
brown goshawk								0
collared sparrowhawk						1		
brown falcon				1				
Australian hobby	1							
peregrine falcon			1					
black-tailed native-hen		3				120		
Australian bustard				1				1

Common name	CWAT01	CWAT02	CWAT03	CWAT04	CWAT05	CWAT06	CWAT07	CWAT08
black-winged stilt				2		5		
black-fronted dotterel						20		
red-kneed dotterel		2				10		
masked lapwing				7		6		
crested pigeon	4	5		3		6	2	
galah	4							
cockatiel	3				5			
rainbow lorikeet							4	
red-winged parrot						3	1	
pale-headed rosella	10	2		2	2		4	4
budgerigar		25		6	7	90	8	500
laughing kookaburra							2	
red-backed fairy-wren	4	3						
striated pardalote	4	2						
weebill	3			8		3		
white-throated gerygone	2						2	
yellow-rumped thornbill		4						
yellow thornbill	1							
singing honeyeater	1	1	2				1	1
grey-fronted honeyeater	1							
fuscous honeyeater							1	
white-plumed honeyeater							2	
yellow-throated miner				6				
spiny-cheeked honeyeater		1			1			
blue-faced honeyeater					2			
crimson chat		5						
jacky winter	2	2	2					
red-capped robin		1						

Common name	CWAT01	CWAT02	CWAT03	CWAT04	CWAT05	CWAT06	CWAT07	CWAT08
grey-crowned babbler		3						
varied sitella	3							
rufous whistler	3	1		1			1	
grey shrike-thrush		1						
crested bellbird	2							
restless flycatcher		1	2			1		
magpie-lark	2	1				10	1	
grey fantail	2	1					3	
willie wagtail	2	1		2	1	8	1	1
black-faced cuckoo-shrike							2	
white-winged triller	2					1		
olive-backed oriole		1						
masked woodswallow						3		
black-faced woodswallow	3					2		
grey butcherbird	2		5					
pied butcherbird	2		1				1	
Australian magpie				2		2		
Torresian crow			1		1	7	1	
apostlebird			6					8
spotted bowerbird	1							
zebra finch		10	25		5	8		
double-barred finch	4	5	25				4	
black-throated finch	1							
plum-headed finch		50	1			150		40
mistletoebird	1		2					
tree martin						37		
rufous songlark								2

Table 7 Details for camera trapping results

Site	Date start	Date finish	Days	Total pictures	Fauna pictures	BTF pictures	Days BTF recorded	Maximum BTF group
CCAM01	23/05/2013	25/06/2013	32	9565	228	0	0	0
CCAM02	23/05/2013	28/06/2013	35	876	550	89	26	41
CCAM03	23/05/2013	19/06/2013	26	6035	90	0	0	0
CCAM04	23/05/2013	15/06/2013	22	3481	65	0	0	0
CCAM05	24/05/2013	28/06/2013	34	2769	183	0	0	0
CCAM06	24/05/2013	28/06/2013	34	663	186	0	0	0
CCAM07	24/05/2013	1/07/2013	37	670	15	0	0	0
CCAM08	24/05/2013	13/05/2013	42	5	1	0	0	0
CCAM09	25/05/2013	28/06/2013	33	358	547	1	1	1
CCAM10	25/05/2013	28/06/2013	33	697	165	0	0	0
CCAM11	29/05/2013	29/06/2013	30	5767	473	13	7	3
CCAM12	29/05/2013	29/06/2013	30	1746	381	41	16	10
CCAM13	26/05/2013	28/05/2013	32	9040	240	0	0	0
CCAM14	26/05/2013	29/05/2013	33	328	54	7	1	11
CCAM15	26/05/2013	30/06/2013	34	3633	913	0	0	0
CCAM16	26/05/2013	30/06/2013	34	5588	285	0	0	0
CCAM17	26/05/2013	30/06/2013	34	919	174	0	0	0
CCAM18	27/05/2013	1/07/2013	34	1997	66	0	0	0
CCAM19	29/05/2013	30/06/2013	31	790	182	0	0	0
CCAM20	29/05/2013	26/06/2013	27	8998	368	1	1	2

3.3 Mixed flocks

Birds operating in mixed flocks were observed on 26 occasions over the 104 x 2 ha counts and 29.5 hours of water body counts (Table 8). The flock size ranged from 2 – 13 species and from 2 – 122 individuals. The most common species within mixed flocks were jacky winter *Microeca fascinans* (n = 12), grey fantail *Rhipidura albiscapa* (n = 10), brown treecreeper *Climacteris picumnus* (n = 7), rufous whistler *Pachycephala rufiventris* (n = 7), white-winged triller *Lalage sueurii*, black-faced woodswallow, double-barred finch *Taeniopygia bichenovii* and rufous songlark *Cincloramphus mathewsi* (n = 6). The black-throated finch were recorded in 4 mixed flocks ranging from 2 – 13 species and were participants in the largest mixed flock recorded (13 species) and with highly abundant participants (white-winged triller 25 individuals, black-faced woodswallows, 20 individuals, double-barred finch 14 individuals, black-throated finch 30 individuals and plum-headed finch 20 individuals).

Non-parametric analysis of variance of bird abundance in mixed flocks with black-throated finch present and black-throated finch absent indicated that the black-faced woodswallow (Z = –2.8, P = 0.004, mean 7.5 individuals) and the willie wagtail *Rhipidura leucophrys* (Z = –2.1, P = 0.031, mean 0.8 individuals) were significantly more abundant in flocks where the black-throated finch was present (Table 9).

3.4 Vegetation at survey sites

The complete vegetation species list and cover mean cover abundance of black-throated finch present and absent sites is tabulated in Appendix C. A total of 170 species representing 41 families were recorded. The species with the highest mean cover recorded were *Eucalyptus similis, Eucalyptus melanophloia, Eucalyptus brownie* (Myrtaceae), *Triodia pungens Themeda triandra, Heteropogon contortus, Bothriochloa ewartiana* (Poaceae) *Acacia leptostachya* (Mimosaceae) and *Carissa lanceolata* (Apocynaceae).

3.5 Bird and plant variation in sites where black-throated finch was present or and absent

The ordinations of bird species composition and plant composition across all 52 x 2 ha sites indicated that there was little clear patterning in species assemblage in sites where black-throated finch were recorded as present or absent (Plate 4 and Plate 5).

The non-parametric tests of variation in bird species abundance across black-throated finch present and absence sites indicated that, considering all sites, ten species were significantly different in abundance. Of these species, only the Torresian crow *Corvus orru* (Z = 2.3, P = 0.020) was more abundant in sites where black-throated finch were absent. Of the nine species that were more abundant where black-throated finch were present notable species included the varied sittella *Daphoenositta chrysoptera* (Z = –2.3, P = 0.019), restless flycatcher *Myiagra inquieta* (Z = -2.2, P = 0.025), black-faced woodswallow (Z = –2.6, P = 0.008) and zebra finch (Z = –2.7, P = 0.006) (Table 9).

Undertaking a similar analysis, but this time considering only the mixed flocks where black-throated finch were present and absent, two species were much more abundant in mixed flocks where black-throated finch were present; black-faced woodswallow (Z = –2.8, P = 0.004) and the willie wagtail (Z = –2.1, P = 0.031) (Table 9).

For the vegetation analysis, all the significant results (two structural measures and seven plant species) indicated a higher cover in black-throated finch present sites and these included hummock grass cover (Z = –2.4, P = 0.015) and then, not unexpectedly, *Triodia pungens* (Z = −2.2, P = 0.024), *Cymbopogon obtectus* (Z = –3.2, P = 0.001), *Panicum effusum* (Z = –3.0, P = 0.002), *and Tripogon loliformis* (Z = –3.6, P = 0.000) (Table 9).

Table 8 Bird species and abundances recorded in each mixed flock, split to indicate which had black-throated finch (southern) present or not

Common name	Black-throated finch present				Black-throated finch absent																			
	6	**10**	**14**	**24**	**1**	**2**	**3**	**4**	**5**	**7**	**8**	**11**	**12**	**13**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**25**	**26**	**27**
diamond dove										2																
budgerigar				15																			32			
red-backed kingfisher																								1		
brown treecreeper	1				2								2				3		3		1					4
variegated fairy-wren																1		2								
red-backed fairy-wren						10				8						8		9								
striated pardalote												2														2
weebill												4							6					2	3	6
white-throated gerygone																			1							
slaty-backed thornbill								1																		
buff-rumped thornbill															6											
yellow-rumped thornbill															5					5	4					3
yellow thornbill									8																	
singing honeyeater														1												1
white-eared honeyeater									2																	
grey-fronted honeyeater												1	2				2									
fuscous honeyeater									6																	
brown honeyeater									8																	
white-throated honeyeater																						1				
striped honeyeater									1																	
jacky winter	3		2					1		3	4								1	1	2		2	1	2	2
hooded robin																					2					
varied sitella	4														4							3				

Common name	Black-throated finch present				Black-throated finch absent																					
rufous whistler	2								2							3		4	1				2	2		
leaden flycatcher																					1					
restless flycatcher			1												3		1									
grey fantail	2					2			4		2			1	1			2			1	1				2
willie wagtail	2		1												1				1							
black-faced cuckoo-shrike															1					1						
white-winged triller	25						1										8				2		6	2		
black-faced woodswallow	20		8	2	6		6																2			
zebra finch	8					2				10	15															
double-barred finch	14	2				2					25										2	2				
black-throated finch	30	8	6	10																						
plum-headed finch	10									25							25									
rufous songlark	1		4										3				3		3	2						

Plate 4 Ordination of bird species composition from all remnant and non-remnant 2 ha sites, indicating which site had black-throated finch present or absent

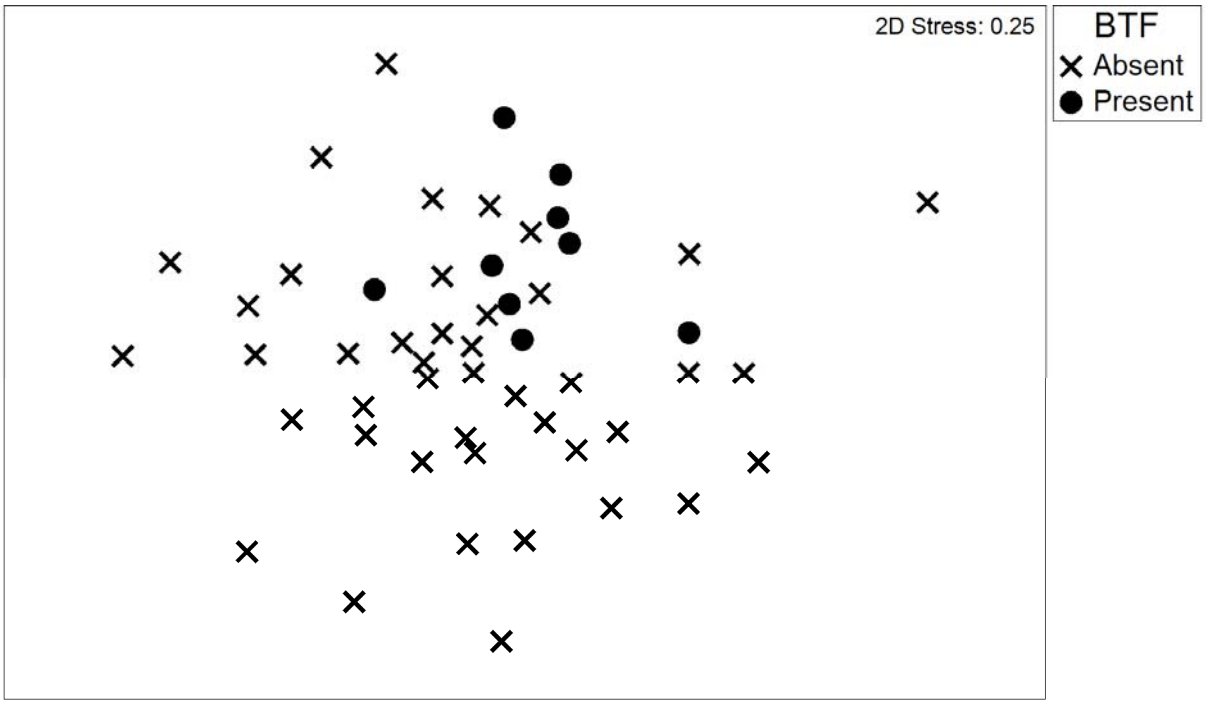

Plate 5 Ordination of vegetation species composition from all remnant and non-remnant 2 ha sites, indicating which site had black-throated finch present or absent

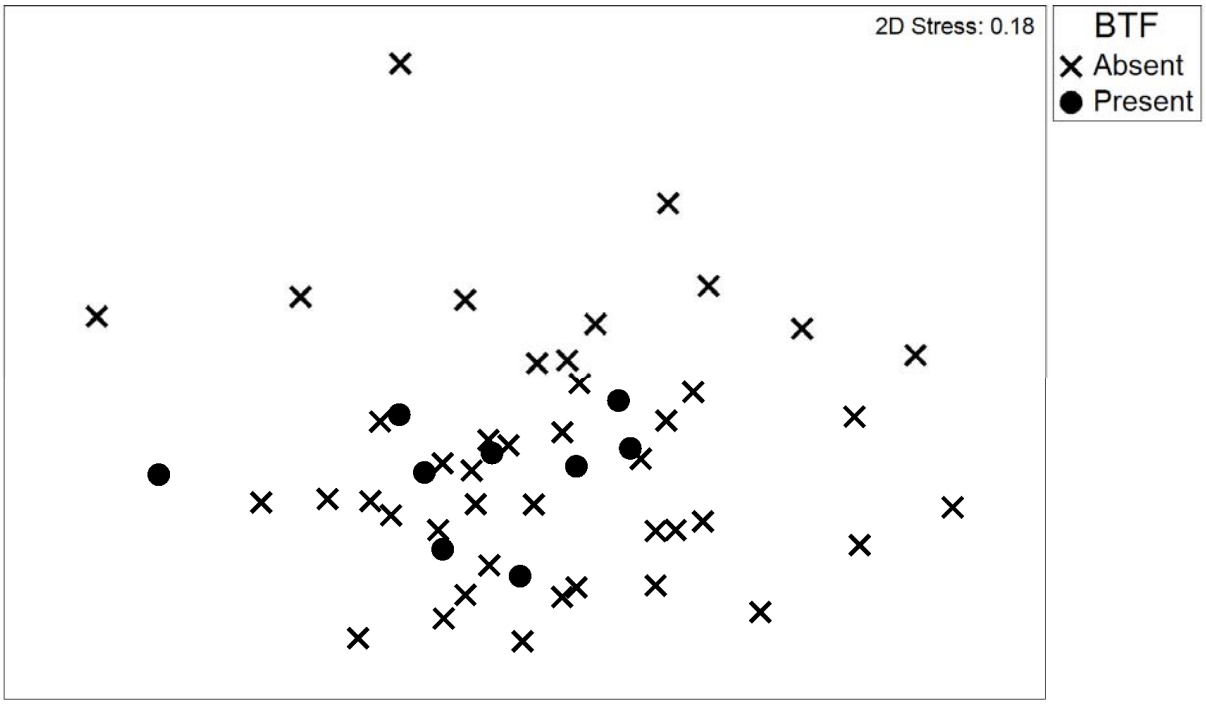

Table 9 Bird and plant species indicating significant variation between black-throated finch (southern) present and absent sites using Mann Whitney U non-parametric analysis

Family	Scientific name	Common name	black-throated finch present	black-throated finch absent	Z [1]	P [1]
All sites - birds						
Climacteridae	*Climacteris picumnus*	brown treecreeper	2.1 (0.6)	1.1 (0.2)	-1.9	0.046
Acanthizidae	*Acanthiza reguloides*	buff-rumped thornbill	1.1 (0.7)	0.3 (0.2)	-2.2	0.030
Meliphagidae	*Lichenostomus plumulus*	grey-fronted honeyeater	1.7 (0.7)	0.5 (0.2)	-2.1	0.032
Neosittidae	*Daphoenositta chrysoptera*	varied sitella	0.9 (0.6)	0.1 (0.1)	-2.3	0.019
Pachycephalidae	*Oreoica gutturalis*	crested bellbird	0.8 (0.3)	0.2 (0.1)	-2.1	0.036
Monarchidae	*Myiagra inquieta*	restless flycatcher	0.9 (0.4)	0.2 (0.1)	-2.2	0.025
Artamidae	*Artamus cinereus*	black-faced woodswallow	3.7 (2.2)	0.8 (0.5)	-2.6	0.008
Corvidae	*Corvus orru*	torresian crow	0.3 (0.2)	2.1 (0.5)	2.3	0.020
Estrildidae	*Taeniopygia guttata*	zebra finch	2.6 (0.9)	1.0 (0.5)	-2.7	0.006
Megaluridae	*Cincloramphus mathewsi*	rufous songlark	1.1 (0.4)	0.5 (0.2)	-2.5	0.012
Mixed flocks only						
Artamidae	*Artamus cinereus*	black-faced woodswallow	7.5 (4.5)	0.6 (0.4)	-2.8	0.004
Rhipiduridae	*Rhipidura leucophrys*	willie wagtail	0.8 (0.5)	0.1 (0.1)	-2.1	0.031
All sites - vegetation						
		Hummock grass cover (%)	12.4 (3.1)	4.6 (1.2)	-2.4	0.015
		Shrub cover (%)	17.1 (2.6)	12.1 (1.0)	-2.2	0.026
Fabeaceae	*Glycine tomentosa*		0.3 (0.1)	0.1 (0.1)	-2.2	0.026
Mimosaceae	*Acacia elachantha*		1.8 (0.4)	0.8 (0.2)	-2.4	0.024
Poaceae	*Cymbopogon obtectus*		3.3 (1.6)	1.0 (0.5)	-3.2	0.001
Poaceae	*Panicum effusum*		0.3 (0.1)	0.1 (0.1)	-3.0	0.002
Poaceae	*Tripogon loliformis*		0.5 (0.2)	0.1 (0.1)	-3.6	0.000
Poaceae	*Triodia pungens*		11.2 (2.8)	4.7 (1.2)	-2.2	0.024
Proteaceae	*Grevillea parallela*		2.9 (1.1)	0.8 (0.2)	-2.6	0.009

Note: [1] Data tabulated is mean abundance (and standard error) and the Z statistic and P level.

4. Discussion

The purpose of this survey was to establish (and report on) a monitoring array across the Study Area in order to collect further information on the habitat preferences, ecology, temporal and spatial variation in distribution, coarse population estimates and effects of land management.

This survey is the first of a series of monitoring surveys that will take place in initially on 4 – 5 occasions over the next 12 months and then in the following years as defined in the black-throated finch Species Management Plan. The survey provides the baseline for long term adaptive monitoring and management being developed for the Project.

To date the monitoring and management has resulted in the establishment of a large number of survey sites (n = 80) using a variety of techniques (i.e. 2 ha counts, water bodies counts and camera traps) and standardised data collection methods. These methods are based on the recommended methods within the Significant Impact Guidelines for the black-throated finch (southern) *Poephila cincta cincta* (DEWHA, 2009a, b).

A review of the first survey results indicates the following in terms of information contributing to knowledge of the black-throated finch ecology in the Study Area, and more widely for north-central and eastern Queensland:

1. A total of 208 observations were made, recognising that some of these might have been recounts of the same birds in certain areas (e.g. CHAB11, and areas around and to the north of 10 mile bore).
2. The highest numbers of black-throated finch are consistently recorded in the intact remnant vegetation dominated by *Eucalyptus melanophloia* woodlands (10.5.5) and the associated *E. similis* (10.5.1) and *E. populnea/brownii* woodlands (10.3.6 / 10.3.28). This vegetation on the site, especially in the north-west, west and south-west, is in particularly good condition due to the low level of artificial watering points, low degree of exotic pasture invasion, the presence of poison bush (*Gastrolobium grandiflora*) which is toxic to cattle, and seemingly a history of low or light grazing. Many grass species that are considered “decreasers”, that is vulnerable to disappear due to cattle grazing, are diverse and of a high cover abundance (Kutt and Kemp, 2012; O'Reagain and Bushell, 2011). This includes a large number of grass species (e.g. *Alloteropsis*, *Triodia*, *Digitaria*, *Enteropogon*, *Eriachne*, *Panicum*) considered preferred food sources for the black-throated finch (Black-Throated Finch Recovery Team, 2007).
3. This survey and the previous targeted black-throated finch work (GHD, 2012), has demonstrated that undertaking standardised 2 ha bird counts in stratified and semi-random locations that targets known habitat in good condition, is more successful in recording black-throated finch locations compared to the recommended water body counts (DEWHA, 2009a). Though water body counts are still an important part of a complete survey, they do not provide good information on habitat use, features of preferred habitat (e.g. plant composition and structure) and distribution in the wider landscape. Data from this survey and previous work indicates that black-throated finch are more likely to utilise smaller and ephemeral water sources (troughs, scrapes, puddles in drainage lines) than large exposed water points.

4. The camera trapping provided a significant and cost effective additional method for recording black-throated finches, with five additional sites reported. The technique demonstrates that the cameras are able to record continuously for over 30 days and present information on daily water use, and time of water use. Interestingly in water sources where finches were recorded, their use was not necessarily daily, suggesting that they might use a variety of different water sources daily. Furthermore, the types of water used were mainly troughs and scrapes (rather than large dams where it is recommended to undertake water source counts). This provides preliminary information for black-throated finch management on site – that habitat use might be controlled by the provisions of raised troughs to manipulate distribution over the Project Site. This needs further investigation. Finally camera traps provide significant secondary information on other species such as feral animals (pigs *Sus scrofa* and cats *Felis catus*), which may be used in feral pest management ion the Project Site.

5. The woodland bird assemblage recorded in the current survey was intact, with the species abundance and richness typical of the *E. melanophloia* and *E. populnea/brownii* woodlands of the Desert Uplands region (Kutt et al., 2012a; Kutt et al., 2012b). The assemblage recorded contained species that are common in woodlands across northern Queensland (e.g. jacky winter, rufous whistler, red-backed fairy wren), but also others that are declining the largely cleared woodlands of south-eastern Australia (e.g. brown treecreeper, grey-crowned babbler, weebill). There was no clear difference in composition of birds across the sites (i.e. between the sites with black-throated finch present or absent), but there were a number of woodland bird species more abundant where black-throated finch was present. This is likely a function of the fact that black-throated finch were found in intact rather than non-remnant vegetation, and the bird abundance and species richness is higher in these sites. These patterns require further investigation and examination after further data is collected in subsequent monitoring.

6. The vegetation patterning between black-throated finch presence and absence sites indicated that particular grass species and woody vegetation are more abundant in sites where black-throated finch is present – some of these reflect the regional ecosystems types they prefer (e.g. *Acacia elachantha*, *Grevillea parallela*), and some reflect an association with preferred diet (e.g. *Triodia pungens*, *Panicum effusum*). As mentioned previously, many of the species preferred as food sources by the black-throated finch are impacted and decrease in the presence of cattle grazing. Over time the vegetation data recorded in sites where the species is consistently present of absent will provide a management tool (i.e. triggers) to monitor improving or declining habitat condition, and the need provide management interventions.

7. Black-throated finches are often found in mixed species feeding flocks often with other granivorous species, and especially with black-faced woodswallows. Mixed feeding flocks are a typical component of the avifauna of the tropical savannas of northern and central Queensland (Vanderduys et al., 2012). The ecological and functional role of these mixed flocks is likely to confer an advantage in predator vigilance and avoidance (e.g. woodswallows as sentinels), and there is evidence that when habitat disturbance disrupts it can have a cascading effect on some elements of the woodland bird assemblage (Garnett et al., 2011).

8. This survey identified nesting sites in the Study Area for the first time. One was evidence of an adult bird carrying nesting material (*Panicum* stalks), and two others were actual

nests being used by black-throated finch. There was no evidence of breeding, and black-throated finch use nests on an annual basis to roost at night, as well as breed (DEWHA, 2009a). The size, shape and location of the nests were typical of other recorded instances of black-throated finch nests in northern Queensland (Black-Throated Finch Recovery Team, 2007).

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Appendices

Appendix A – Complete bird species list for all surveys, indicating whether species was records in 2 ha counts, water body counts or both

Family	Scientific name	Common name	2 ha	Water
Casuariidae	*Dromaius novaehollandiae*	emu	+	+
Phasianidae	*Coturnix ypsilophora*	brown quail		+
Anatidae	*Chenonetta jubata*	Australian wood duck		+
Anatidae	*Anas superciliosa*	Pacific black duck		+
Anatidae	*Anas gracilis*	grey teal		+
Anatidae	*Malacorhynchus membranaceus*	pink-eared duck		+
Anatidae	*Aythya australis*	hardhead		+
Podicipedidae	*Tachybaptus novaehollandiae*	Australasian grebe		+
Anhingidae	*Anhinga novaehollandiae*	Australasian darter		+
Phalacrocoracidae	*Microcarbo melanoleucos*	little pied cormorant		+
Phalacrocoracidae	*Phalacrocorax sulcirostris*	little black cormorant		+
Ardeidae	*Egretta novaehollandiae*	white-faced heron		+
Ardeidae	*Ardea pacifica*	white-necked heron		+
Threskiornithidae	*Threskiornis spinicollis*	straw-necked ibis	+	+
Threskiornithidae	*Platalea regia*	royal spoonbill	+	+
Threskiornithidae	*Platalea flavipes*	yellow-billed spoonbill	+	
Ciconiidae	*Ephippiorhynchus asiaticus*	black-necked stork		+
Accipitridae	*Milvus migrans*	black kite	+	
Accipitridae	*Haliastur sphenurus*	whistling kite	+	+
Accipitridae	*Circus assimilis*	spotted harrier		+
Accipitridae	*Accipiter fasciatus*	brown goshawk	+	+
Accipitridae	*Accipiter cirrhocephalus*	collared sparrowhawk		+

Family	Scientific name	Common name	2 ha	Water
Accipitridae	*Aquila audax*	wedge-tailed eagle	+	
Falconidae	*Falco berigora*	brown falcon	+	+
Falconidae	*Falco longipennis*	Australian hobby		+
Falconidae	*Falco peregrinus*	peregrine falcon		+
Falconidae	*Falco cenchroides*	nankeen kestrel	+	
Rallidae	*Tribonyx ventralis*	black-tailed native-hen		+
Otididae	*Ardeotis australis*	Australian bustard	+	+
Turnicidae	*Turnix pyrrhothorax*	red-chested button-quail	+	
Recurvirostridae	*Himantopus himantopus*	black-winged stilt		+
Charadriidae	*Elseyornis melanops*	black-fronted dotterel		+
Falconidae	*Erythrogonys cinctus*	red-kneed dotterel		+
Falconidae	*Vanellus miles miles*	masked lapwing		+
Falconidae	*Ocyphaps lophotes*	crested pigeon	+	+
Columbidae	*Geopelia cuneata*	diamond dove	+	
Columbidae	*Geopelia striata*	peaceful dove	+	
Columbidae	*Geopelia humeralis*	bar-shouldered dove	+	
Cacatuidae	*Eolophus roseicapillus*	galah	+	+
Cacatuidae	*Nymphicus hollandicus*	cockatiel	+	+
Psittacidae	*Trichoglossus haematodus haematodus*	rainbow lorikeet	+	+
Psittacidae	*Aprosmictus erythropterus*	red-winged parrot	+	+
Psittacidae	*Platycercus adscitus adscitus*	pale-headed rosella	+	+
Psittacidae	*Melopsittacus undulatus*	budgerigar	+	+
Cuculidae	*Centropus phasianinus*	pheasant coucal	+	
Cuculidae	*Chalcites basalis*	Horsfield's bronze-cuckoo	+	
Cuculidae	*Chalcites lucidus*	shining bronze-cuckoo	+	
Cuculidae	*Cacomantis pallidus*	pallid cuckoo	+	

Family	Scientific name	Common name	2 ha	Water
Cuculidae	*Cacomantis flabelliformis*	fan-tailed cuckoo	+	
Aegothelidae	*Aegotheles cristatus*	Australian owlet-nightjar	+	
Halcyonidae	*Dacelo novaeguineae*	laughing kookaburra	+	+
Halcyonidae	*Dacelo leachii*	blue-winged kookaburra	+	
Halcyonidae	*Todiramphus pyrrhopygius*	red-backed kingfisher	+	
Halcyonidae	*Todiramphus sanctus*	sacred kingfisher	+	
Climacteridae	*Climacteris picumnus picumnus*	brown treecreeper	+	
Maluridae	*Malurus lamberti*	variegated fairy-wren	+	
Maluridae	*Malurus melanocephalus*	red-backed fairy-wren	+	+
Pardalotidae	*Pardalotus rubricatus*	red-browed pardalote	+	
Pardalotidae	*Pardalotus striatus*	striated pardalote	+	+
Pardalotidae	*Smicrornis brevirostris*	weebill	+	+
Pardalotidae	*Gerygone fusca*	western gerygone	+	
Pardalotidae	*Gerygone albogularis*	white-throated gerygone	+	+
Acanthizidae	*Acanthiza robustirostris*	slaty-backed thornbill	+	
Acanthizidae	*Acanthiza reguloides*	buff-rumped thornbill	+	
Acanthizidae	*Acanthiza chrysorrhoa*	yellow-rumped thornbill	+	+
Acanthizidae	*Acanthiza nana*	yellow thornbill	+	+
Meliphagidae	*Lichenostomus virescens*	singing honeyeater	+	+
Meliphagidae	*Lichenostomus flavus*	yellow honeyeater	+	
Meliphagidae	*Lichenostomus leucotis*	white-eared honeyeater	+	
Meliphagidae	*Lichenostomus plumulus*	grey-fronted honeyeater	+	+
Meliphagidae	*Lichenostomus fuscus*	fuscous honeyeater	+	+
Meliphagidae	*Lichenostomus penicillatus*	white-plumed honeyeater	+	+
Meliphagidae	*Manorina flavigula*	yellow-throated miner	+	+
Meliphagidae	*Acanthagenys rufogularis*	spiny-cheeked honeyeater	+	+

Family	Scientific name	Common name	2 ha	Water
Meliphagidae	*Lichmera indistincta*	brown honeyeater	+	
Meliphagidae	*Melithreptus albogularis*	white-throated honeyeater	+	
Meliphagidae	*Entomyzon cyanotis*	blue-faced honeyeater	+	+
Meliphagidae	*Philemon corniculatus*	noisy friarbird	+	
Meliphagidae	*Philemon citreogularis*	little friarbird	+	
Meliphagidae	*Plectorhyncha lanceolata*	striped honeyeater	+	
Meliphagidae	*Epthianura tricolor*	crimson chat		+
Petroicidae	*Microeca fascinans*	jacky winter	+	+
Petroicidae	*Petroica goodenovii*	red-capped robin	+	+
Petroicidae	*Melanodryas cucullata picata*	hooded robin	+	
Pomatostomidae	*Pomatostomus temporalis temporalis*	grey-crowned babbler	+	+
Neosittidae	*Daphoenositta chrysoptera*	varied sitella	+	+
Pachycephalidae	*Pachycephala rufiventris*	rufous whistler	+	+
Pachycephalidae	*Colluricincla harmonica*	grey shrike-thrush	+	+
Pachycephalidae	*Oreoica gutturalis*	crested bellbird	+	+
Monarchidae	*Myiagra rubecula*	leaden flycatcher	+	
Monarchidae	*Myiagra inquieta*	restless flycatcher	+	+
Monarchidae	*Grallina cyanoleuca*	magpie-lark	+	+
Rhipiduridae	*Rhipidura albiscapa*	grey fantail	+	+
Rhipiduridae	*Rhipidura leucophrys*	willie wagtail	+	+
Campephagidae	*Coracina novaehollandiae*	black-faced cuckoo-shrike	+	+
Campephagidae	*Coracina papuensis*	white-bellied cuckoo-shrike	+	
Campephagidae	*Lalage sueurii*	white-winged triller	+	+
Oriolidae	*Oriolus sagittatus*	olive-backed oriole		+
Artamidae	*Artamus personatus*	masked woodswallow		+
Artamidae	*Artamus cinereus albiventris*	black-faced woodswallow	+	+

Family	Scientific name	Common name	2 ha	Water
Artamidae	*Cracticus torquatus*	grey butcherbird	+	+
Artamidae	*Cracticus nigrogularis*	pied butcherbird	+	+
Artamidae	*Cracticus tibicen*	Australian magpie	+	+
Artamidae	*Strepera graculina graculina*	pied currawong	+	
Corvidae	*Corvus orru*	Torresian crow	+	+
Corcoracidae	*Struthidea cinerea*	apostlebird	+	+
Ptilonorhynchidae	*Ptilonorhynchus maculatus*	spotted bowerbird	+	+
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit	+	
Estrildidae	*Taeniopygia guttata*	zebra finch	+	+
Estrildidae	*Taeniopygia bichenovii*	double-barred finch	+	+
Estrildidae	*Poephila cincta cincta*	black-throated finch	+	+
Estrildidae	*Neochmia modesta*	plum-headed finch	+	+
Nectariniidae	*Dicaeum hirundinaceum*	mistletoebird	+	+
Hirundinidae	*Petrochelidon nigricans*	tree martin	+	+
Megaluridae	*Megalurus timoriensis*	tawny grassbird	+	
Megaluridae	*Cincloramphus mathewsi*	rufous songlark	+	+
Sylviidae	*Cisticola exilis*	golden-headed cisticola	+	

Appendix B – Complete species list for 2-ha bird counts, indicating abundance within black-throated finch (southern) present and absent sites.

Family	Scientific name	Common name short	black-throated finch present	black-throated finch absent
Casuariidae	*Dromaius novaehollandiae*	emu	2	4
Threskiornithidae	*Threskiornis spinicollis*	straw-necked ibis		1
Threskiornithidae	*Platalea regia*	royal spoonbill		1
Threskiornithidae	*Platalea flavipes*	yellow-billed spoonbill		2
Accipitridae	*Milvus migrans*	black kite		3
Accipitridae	*Haliastur sphenurus*	whistling kite	1	15
Accipitridae	*Accipiter fasciatus*	brown goshawk		1
Accipitridae	*Aquila audax*	wedge-tailed eagle		5
Falconidae	*Falco berigora*	brown falcon	2	3
Falconidae	*Falco cenchroides*	nankeen kestrel		7
Otididae	*Ardeotis australis*	Australian bustard		7
Turnicidae	*Turnix pyrrhothorax*	red-chested button-quail		1
Columbidae	*Ocyphaps lophotes*	crested pigeon		26
Columbidae	*Geopelia cuneata*	diamond dove		2
Columbidae	*Geopelia striata*	peaceful dove		4
Columbidae	*Geopelia humeralis*	bar-shouldered dove		4
Cacatuidae	*Eolophus roseicapillus*	galah	1	25
Cacatuidae	*Nymphicus hollandicus*	cockatiel		32
Psittacidae	*Trichoglossus haematodus haematodus*	rainbow lorikeet		10
Psittacidae	*Aprosmictus erythropterus*	red-winged parrot	4	26
Psittacidae	*Platycercus adscitus adscitus*	pale-headed rosella	4	33
Psittacidae	*Melopsittacus undulatus*	budgerigar	187	1357
Cuculidae	*Centropus phasianinus*	pheasant coucal	1	1

Family	Scientific name	Common name short	black-throated finch present	black-throated finch absent
Cuculidae	*Chalcites basalis*	Horsfield's bronze-cuckoo		1
Cuculidae	*Chalcites lucidus*	shining bronze-cuckoo		2
Cuculidae	*Cacomantis pallidus*	pallid cuckoo		2
Cuculidae	*Cacomantis flabelliformis*	fan-tailed cuckoo	1	1
Aegothelidae	*Aegotheles cristatus*	Australian owlet-nightjar	1	2
Halcyonidae	*Dacelo novaeguineae*	laughing kookaburra		2
Halcyonidae	*Dacelo leachii*	blue-winged kookaburra		1
Halcyonidae	*Todiramphus pyrrhopygius*	red-backed kingfisher	2	3
Halcyonidae	*Todiramphus sanctus*	sacred kingfisher		4
Climacteridae	*Climacteris picumnus picumnus*	brown treecreeper	19	47
Maluridae	*Malurus lamberti*	variegated fairy-wren		32
Maluridae	*Malurus melanocephalus*	red-backed fairy-wren	45	168
Pardalotidae	*Pardalotus rubricatus*	red-browed pardalote	2	4
Pardalotidae	*Pardalotus striatus*	striated pardalote	8	58
Acanthizidae	*Smicrornis brevirostris*	weebill	48	224
Acanthizidae	*Gerygone fusca*	western gerygone		3
Acanthizidae	*Gerygone albogularis*	white-throated gerygone	4	9
Acanthizidae	*Acanthiza robustirostris*	slaty-backed thornbill		2
Acanthizidae	*Acanthiza reguloides*	buff-rumped thornbill	10	12
Acanthizidae	*Acanthiza chrysorrhoa*	yellow-rumped thornbill	7	32
Acanthizidae	*Acanthiza nana*	yellow thornbill	2	15
Meliphagidae	*Lichenostomus virescens*	singing honeyeater	15	83
Meliphagidae	*Lichenostomus flavus*	yellow honeyeater		1
Meliphagidae	*Lichenostomus leucotis*	white-eared honeyeater		2
Meliphagidae	*Lichenostomus plumulus*	grey-fronted honeyeater	15	23
Meliphagidae	*Lichenostomus fuscus*	fuscous honeyeater		10
Meliphagidae	*Lichenostomus penicillatus*	white-plumed honeyeater	2	2

Family	Scientific name	Common name short	black-throated finch present	black-throated finch absent
Meliphagidae	*Manorina flavigula*	yellow-throated miner	1	12
Meliphagidae	*Acanthagenys rufogularis*	spiny-cheeked honeyeater		2
Meliphagidae	*Lichmera indistincta*	brown honeyeater	1	12
Meliphagidae	*Melithreptus albogularis*	white-throated honeyeater		9
Meliphagidae	*Entomyzon cyanotis*	blue-faced honeyeater		10
Meliphagidae	*Philemon corniculatus*	noisy friarbird	5	21
Meliphagidae	*Philemon citreogularis*	little friarbird	1	1
Meliphagidae	*Plectorhyncha lanceolata*	striped honeyeater		3
Petroicidae	*Microeca fascinans*	jacky winter	21	54
Petroicidae	*Petroica goodenovii*	red-capped robin		2
Petroicidae	*Melanodryas cucullata picata*	hooded robin	2	10
Pomatostomidae	*Pomatostomus temporalis temporalis*	grey-crowned babbler		37
Neosittidae	*Daphoenositta chrysoptera*	varied sitella	8	3
Pachycephalidae	*Pachycephala rufiventris*	rufous whistler	26	90
Pachycephalidae	*Colluricincla harmonica*	grey shrike-thrush		4
Pachycephalidae	*Oreoica gutturalis*	crested bellbird	5	9
Monarchidae	*Myiagra rubecula*	leaden flycatcher		1
Monarchidae	*Myiagra inquieta*	restless flycatcher	8	7
Monarchidae	*Grallina cyanoleuca*	magpie-lark		12
Rhipiduridae	*Rhipidura albiscapa*	grey fantail	8	67
Rhipiduridae	*Rhipidura leucophrys*	willie wagtail	10	44
Campephagidae	*Coracina novaehollandiae*	black-faced cuckoo-shrike	7	21
Campephagidae	*Coracina papuensis*	white-bellied cuckoo-shrike		3
Campephagidae	*Lalage sueurii*	white-winged triller	28	30
Artamidae	*Artamus cinereus albiventris*	black-faced woodswallow	33	34
Artamidae	*Cracticus torquatus*	grey butcherbird	3	18
Artamidae	*Cracticus nigrogularis*	pied butcherbird	9	41

Family	Scientific name	Common name short	black-throated finch present	black-throated finch absent
Artamidae	*Cracticus tibicen*	Australian magpie	9	37
Artamidae	*Strepera graculina graculina*	pied currawong		1
Corvidae	*Corvus orru*	Torresian crow	3	92
Corcoracidae	*Struthidea cinerea*	apostlebird		10
Ptilonorhynchidae	*Ptilonorhynchus maculatus*	spotted bowerbird		1
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit		1
Estrildidae	*Taeniopygia guttata*	zebra finch	23	42
Estrildidae	*Taeniopygia bichenovii*	double-barred finch	20	59
Estrildidae	*Poephila cincta cincta*	black-throated finch	101	
Estrildidae	*Neochmia modesta*	plum-headed finch	10	170
Nectariniidae	*Dicaeum hirundinaceum*	mistletoebird	4	6
Hirundinidae	*Petrochelidon nigricans*	tree martin		6
Megaluridae	*Megalurus timoriensis*	tawny grassbird		1
Megaluridae	*Cincloramphus mathewsi*	rufous songlark	10	22
Sylviidae	*Cisticola exilis*	golden-headed cisticola		4

Appendix C – Complete plant species list for 2-ha bird count areas, indicating mean cover within black-throated finch (southern) present and absent sites.

Family	Species	black-throated finch present	black-throated finch absent
Adiantaceae	*Cheilanthes sieberi*		0.2
Acanthaceae	*Brunoniella australis*	0.4	0.4
Acanthaceae	*Dipteracanthus australasicus*	1.3	0.9
Acanthaceae	*Rostellularia adscendens*	0.4	0.5
Amaranthaceae	*Gomphrena canescens subsp. canescens*		0.4
Amaranthaceae	*unidentified Alternanthera*		0.4
Apocynaceae	*Carissa lanceolata*	7.4	4.1
Apocynaceae	*Carissa ovata*	4.3	4.9
Asteraceae	*Calotis cuneata*		0.4
Asteraceae	*Chrysocephalum apiculatum*	0.9	1.0
Asteraceae	*Parthenium hysterophorus*		0.7
Asteraceae	*Peripleura hispidula var. hispidula*		0.6
Asteraceae	*Pterocaulon serrulatum var. serrulatum*		0.4
Asteraceae	*Pterocaulon sphacelatum*	0.2	3.0
Asteraceae	*unidentified Wedelia*	0.4	0.4
Cactaceae	*Opuntia tomentosa*		4.0
Caesalpiniaceae	*Cassia brewsteri*		1.0
Caesalpiniaceae	*Lysiphyllum carronii*		2.8
Campanulaceae	*unidentified Wahlenbergia*	0.2	1.2
Capparaceae	*Capparis lasiantha*	0.8	2.0
Celastraceae	*Maytenus cunninghamii*	1.9	1.7
Chenopodiaceae	*Maireana microphylla*		1.0
Combretaceae	*Terminalia oblongata*		3.0
Convolvulaceae	*Bonamia media*		1.0
Convolvulaceae	*Evolvulus alsinoides*	1.2	0.6
Cyperaceae	*unidentified Cyperus*		0.7
Cyperaceae	*unidentified Fimbristylis*		1.3
Cyperaceae	*unidentified Scleria*	0.6	0.8
Erythroxylaceae	*Erythroxylum australe*	2.0	
Euphorbiaceae	*Chamaesyce drummondii*	1.4	0.4
Euphorbiaceae	*Euphorbia tannensis subsp. tannensis*		0.2
Euphorbiaceae	*Petalostigma banksii*	2.5	3.5
Euphorbiaceae	*Petalostigma pubescens*	3.0	2.5

Family	Species	black-throated finch present	black-throated finch absent
Euphorbiaceae	*Phyllanthus fuernrohrii*		0.6
Euphorbiaceae	*Phyllanthus maderaspatensis*		1.1
Euphorbiaceae	*Phyllanthus virgatus*	0.3	0.4
Euphorbiaceae	*unidentified Euphorbia*		0.2
Fabaceae	*Crotalaria montana*	0.2	
Fabaceae	*Erythrina vespertilio*		3.0
Fabaceae	*Glycine tomentella*	0.5	0.5
Fabaceae	*Indigofera colutea*		0.8
Fabaceae	*Indigofera linifolia*		0.4
Fabaceae	*Indigofera pratensis*	0.6	2.4
Fabaceae	*Jacksonia ramosissima*		11.5
Fabaceae	*Rhynchosia minima*	0.3	0.4
Fabaceae	*unidentified Indigofera*	1.0	
Fabaceae	*unidentified Stylosanthes*	0.9	0.9
Fabaceae	*unidentified Tephrosia*		0.8
Fabaceae	*Zornia dyctiocarpa*		0.3
Fabaceae	*Zornia muriculata*	0.5	0.5
Goodeniaceae	*Goodenia glabra*		6.6
Goodeniaceae	*Goodenia hirsuta*	0.2	0.4
Hemerocallidaceae	*Tricoryne elatior*	0.8	0.5
Juncaceae	*unidentified Juncus*		1.0
Lauraceae	*unidentified Cassytha*	0.7	0.7
Malvaceae	*Malvastrum americanum*	0.2	
Malvaceae	*Sida cordifolia*		0.4
Malvaceae	*Sida fibulifera*	0.2	0.5
Malvaceae	*Sida spinosa*		0.4
Malvaceae	*unidentified Sida*		0.4
Malvaceae	*Urena lobata*		0.6
Meliaceae	*Owenia acidula*		2.7
Mimosaceae	*Acacia bidwillii*	1.1	1.0
Mimosaceae	*Acacia coriacea*	2.6	3.5
Mimosaceae	*Acacia elachantha*	2.4	2.1
Mimosaceae	*Acacia excelsa*	2.6	2.7
Mimosaceae	*Acacia farnesiana*	0.2	2.5
Mimosaceae	*Acacia galioides*		4.3
Mimosaceae	*Acacia harpophylla*		4.4
Mimosaceae	*Acacia holosericea var. holosericea*		4.1
Mimosaceae	*Acacia laccata*	1.5	2.5
Mimosaceae	*Acacia lazaridis*		1.8
Mimosaceae	*Acacia leptostachya*	8.5	4.0
Mimosaceae	*Acacia melleodora*	6.8	1.4

Family	Species	black-throated finch present	black-throated finch absent
Mimosaceae	*Acacia platycarpa*		3.7
Mimosaceae	*Acacia salicina*		4.8
Mimosaceae	*Acacia simsii*		3.5
Mimosaceae	*Acacia tenuissima*	4.3	1.4
Mimosaceae	*unidentified Acacia*		2.6
Mimosaceae	*unidentified Neptunia*		0.3
Myoporaceae	*Eremophila longifolia*	1.0	
Myoporaceae	*Eremophila mitchellii*	2.5	2.0
Myoporaceae	*Myoporum acuminatum*		4.0
Myoporaceae	*unidentified Myoporum*		1.0
Myrtaceae	*Corymbia brachycarpa*	2.5	5.5
Myrtaceae	*Corymbia clarksoniana*	3.5	4.3
Myrtaceae	*Corymbia dallachiana*	5.3	5.0
Myrtaceae	*Corymbia setosa*	2.8	5.3
Myrtaceae	*Corymbia tessellaris*		6.0
Myrtaceae	*Eucalyptus brownii*	7.4	8.9
Myrtaceae	*Eucalyptus coolabah*		14.6
Myrtaceae	*Eucalyptus drepanophylla*		11.5
Myrtaceae	*Eucalyptus melanophloia*	10.6	10.8
Myrtaceae	*Eucalyptus similis*	27.5	10.7
Myrtaceae	*Eucalyptus tereticornis*		8.1
Myrtaceae	*Melaleuca fluviatilis*		2.5
Myrtaceae	*Melaleuca nervosa*	2.0	3.0
Myrtaceae	*unidentified Corymbia*		5.0
Oxalidaceae	*unidentified Oxalis*		0.2
Pittosporaceae	*Bursaria incana*	2.0	3.8
Poaceae	*Alloteropsis semialata*	2.1	1.0
Poaceae	*Aristida calycina var. calycina*	1.5	2.3
Poaceae	*Aristida contorta*	1.2	3.9
Poaceae	*Aristida holathera*	1.7	0.9
Poaceae	*Aristida hygrometrica*		1.0
Poaceae	*Aristida ingrata*	3.3	3.2
Poaceae	*Aristida jerichoensis*	5.4	3.4
Poaceae	*Aristida latifolia*	1.4	1.0
Poaceae	*Aristida queenslandica*		0.9
Poaceae	*Astrebla pectinata*		5.0
Poaceae	*Bothriochloa decipiens*		7.0
Poaceae	*Bothriochloa ewartiana*	7.6	10.6
Poaceae	*Bothriochloa pertusa*		1.2
Poaceae	*Cenchrus ciliaris*	3.9	15.0
Poaceae	*Chrysopogon fallax*	3.0	4.3

Family	Species	black-throated finch present	black-throated finch absent
Poaceae	*Cleistochloa subjuncea*	1.8	
Poaceae	*Cymbopogon obtectus*	4.3	4.2
Poaceae	*Dactyloctenium radulans*		12.0
Poaceae	*Dichanthium sericeum*		1.8
Poaceae	*Digitaria ammophila*		1.2
Poaceae	*Digitaria brownii*	0.9	1.7
Poaceae	*Digitaria divaricatissima*		0.6
Poaceae	*Echinochloa crus-galli*		2.0
Poaceae	*Enneapogon polyphyllus*	1.4	1.8
Poaceae	*Enneapogon robustissimus*		0.8
Poaceae	*Enteropogon ramosus*		0.5
Poaceae	*Eragrostis cumingii*		1.8
Poaceae	*Eragrostis lacunaria*	0.8	0.7
Poaceae	*Eragrostis leptostachya*		0.6
Poaceae	*Eragrostis sororia*	0.6	
Poaceae	*Eragrostis speciosa*	0.8	0.6
Poaceae	*Eragrostis tenuifolia*		2.0
Poaceae	*Eriachne mucronata*	2.0	2.6
Poaceae	*Eriachne obtusa*		2.4
Poaceae	*Eulalia aurea*	2.4	1.9
Poaceae	*Heteropogon contortus*	8.8	9.1
Poaceae	*Iseilema vaginiflorum*		1.0
Poaceae	*Melinis repens*		1.8
Poaceae	*Oxychloris scariosa*		1.2
Poaceae	*Panicum decompositum*		0.7
Poaceae	*Panicum effusum*	0.6	1.0
Poaceae	*Sarga plumosum*	3.0	8.0
Poaceae	*Schizachyrium fragile*	4.0	1.8
Poaceae	*Sehima nervosum*	6.6	3.4
Poaceae	*Themeda avenacea*	0.6	2.0
Poaceae	*Themeda triandra*	10.1	6.2
Poaceae	*Triodia pungens*	14.4	11.3
Poaceae	*Tripogon loliiformis*	1.0	1.0
Poaceae	*Urochloa mosambicensis*		1.0
Polygonaceae	*Muehlenbeckia florulenta*	1.0	0.8
Proteaceae	*Grevillea glauca*		2.5
Proteaceae	*Grevillea parallela*	2.9	2.2
Proteaceae	*Grevillea pteridifolia*	3.8	5.0
Proteaceae	*Grevillea striata*	2.0	2.5
Proteaceae	*Hakea lorea subsp. lorea*	1.7	1.9
Rhamnaceae	*Alphitonia excelsa*		3.6

Family	Species	black-throated finch present	black-throated finch absent
Rhamnaceae	*Ventilago viminalis*	2.0	
Rutaceae	*Citrus glauca*		1.0
Rutaceae	*Flindersia dissosperma*		2.5
Santalaceae	*Santalum lanceolatum*		2.8
Sapindaceae	*Atalaya hemiglauca*		1.5
Sapindaceae	*unidentified Dodonaea*		2.5
Solanaceae	*Solanum parvifolium*	0.2	
Sterculiaceae	*Brachychiton populneus subsp. trilobus*		2.9
Sterculiaceae	*Melhania oblongifolia*	0.2	0.4
Sterculiaceae	*Waltheria indica*	0.4	0.0
Stylidiaceae	*unidentified Stylidium*	0.2	0.4
Tiliaceae	*Grewia retusifolia*	1.1	1.1
Violaceae	*Hybanthus enneaspermus*		0.8
Xanthorrhoeaceae	*Xanthorrhoea johnsonii*		3.0

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