



# **May 2011 Black-throated Finch Surveys and Habitat Assessments**

## **Mine Site Galilee Coal Project (Northern Export Facility)**

Prepared for:	<b>Waratah Coal Pty Ltd Natasha McIntosh, Yeats Consulting Engineers</b>
Prepared by:	<b>Lindsay Agnew, Austecology</b>
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## 1. Introduction

### 1.1. Background and Purpose

Waratah Coal proposes to establish coal mining operations on exploration leases situated approximately 35 kilometres north-west of Alpha, Central Queensland. Waratah Coal also proposes to transport coal, via rail, to a new coal terminal on land within the Port of Abbot Point and the Abbot Point State Development Area (APSDA).

As part of the environmental investigation process for the new mine site, Waratah Coal has commissioned Austecology to provide a detailed information resource in regards to the site's value to Black-throated Finch (southern) *Poephila cincta cincta*, and the implications of the proposed development for the values identified. The Black-throated Finch (southern) is listed as endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA).

It is intended that the final information package will ultimately support a response to the Department of Sustainability, Environment, Water, Population and Communities (SEWPC) as part of Waratah Coal's submission of an environmental impact statement (EIS) for the proposed project.

This report provides preliminary advice on the initial stages of an on-going site survey and habitat assessment program for the Black-throated Finch (southern). On completion of the field survey program, the final report will provide a detailed interpretation of the findings of the field surveys and desktop information review, and a detailed assessment of the implications of the proposed project in regards to the study findings. This will be used to inform the supplementary environmental impact statement (SEIS) and associated mitigation and offset measures to be considered.

### 1.2. Terminology and Nomenclature

#### 1.2.1. Study Site and Surrounds

The *proposed mining lease boundary* is located within Waratah Coal's mining tenements (part of EPC1040 and EPC1079, hereafter the *mine site*), near Alpha in the Galilee Basin, Central Queensland. The southern extent of the proposed mining lease boundary is located approximately 20 kilometers north-west of the township of Alpha. The southernmost extent of the proposed mining operations is located approximately 35 kilometers northwest of Alpha.

For the purposes of this report, the *study site* comprises an area which includes the *mine site* and is part of the *proposed mining lease boundary* (see Figure 2-1).

In this report, the term *surrounding area* refers generally to the lands surrounding and in the vicinity of the *study site*, including the townships of Alpha, Jericho, Aramac and Clermont.

The *study site* is embedded within the *Desert Uplands Bioregion*. The *Desert Uplands Bioregion* (BUP) is one of 13 biogeographical areas of Queensland, and extends between Blackall and Pentland within central northern Queensland (Morgan 1999). It encompasses approximately 7.033 million hectares of semi-arid environments.

### 1.2.2. Fauna and Vegetation

Nomenclature for avifauna used in throughout this report follows Christidis and Boles (2008). The acronym BTF is used for the Black-throated Finch (southern) *Poephila cincta cincta*.

Within this report, the conservation status of a species may be described as *Endangered*, *Vulnerable*, *Regionally Vulnerable*, *Rare*, *Migratory*, *Near Threatened* or *Least Concern*. These terms are used in accordance with the provisions of the Queensland *Nature Conservation Act 1992* (NCA) and its regulations and amendments, and/or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA). *Threatened* is a common term used to collectively describe *Endangered* and *Vulnerable* species.

Vegetation type descriptions used (e.g. woodland, open woodland, shrubland, and grassland) are based on the structural types described by Specht (1970) or by way of a regional ecosystem description (as per the Regional Ecosystem Description Database (REDD) (DERM 2010)).

### 1.3. Summary Study Site Description

The study site encompasses and/or includes part of the following properties: Spring Creek; Kia Ora; Glen Innes; Lampton Meadows; Cavendish; Hobartville; and Salt Bush. The predominant land use across study site is cattle grazing. A significant proportion of study site has been cleared of native vegetation and is maintained as cleared pasture for cattle grazing (e.g. Kia Ora in the north, and Horbatville in the east). A large part of this area has been subject to blade ploughing and the introduction of exotic pasture grasses. In these areas, Buffel Grass (*Pennisetum ciliare*) is dominant.

In contrast, a notable area of woodland habitats (including native remnant and native regrowth) has been retained throughout study site (e.g. Glen Innes within the central sector, and parts of Cavendish and Lampton Meadows in the west). Generally, these areas are also subject to cattle grazing, though it is apparent, that there are differences in grazing management practices which are implemented throughout these remnant woodland areas (e.g. differences in stocking rates, retention native pasture, and weed control). Woodland habitats are dominated by eucalypts, principally Silver-leaved Ironbark (*Eucalyptus melanophloia*) and Poplar Box (*Eucalyptus populnea*), and support a diversity of native grasses, though also introduced taxa (e.g. Buffel Grass).

Glen Innes station, within the central sector of the study site, supports the Bimblebox Nature Refuge, gazetted in 2003 under the *Nature Conservation (Protected Areas) Regulation 1994* (SL 2003 No. 82). The majority of its 7,912ha supports Silver-leaved Ironbark and Poplar Box woodland.

The study site is located within the Belyando River catchment, which is part of the larger Burdekin River catchment. The study site is transected by a variety of seasonal watercourses. The Spring Creek system drains the north-west sector of EPC1040. This part of the site supports a variety of mesas and plateaus and vegetation types, including bloodwood open woodlands (dominated by *Corymbia trachyphloia*) and woodlands dominated by Lancewood (*Acacia shirleyi*). The Spring Creek system drains east and north, part of which connects with the Lagoon Creek system (off-site and to the north).

The Lagoon Creek system drains generally northwards through the south-north extent of the study site. The system includes:

- Pebbly Creek - draining east across the central sector of the site (through the Cavendish and Glen Innes properties);
- Beta Creek - which drains northwards through the southern central part of the site (through the Lampton Meadows property);
- Tallarenha Creek – draining northwards through the south-eastern part of the site; and
- Salt Bush Creek - draining north through the eastern areas from the south-eastern sector of the study site.

Both Beta and Tallarenha Creeks join within the central-eastern part of the site to form Lagoon Creek, where it continues to drain in a northerly direction through the north-western corner of the study site. River Red Gum (*Eucalyptus camaldulensis*) is a relatively common feature along these waterways, particularly from about the confluence of Beta and Tallarenha Creeks and northwards (where *Eucalyptus tessellaris* is often a co-dominant within riparian areas). Within these areas, large hollow-bearing trees can be a relatively common feature.

#### **1.4. Study Site and Land Use Context**

As noted previously, the predominant land use across the study site is cattle grazing, though it is apparent that grazing management practices differ between properties.

The Desert Uplands was settled by pastoralists during the 1860s and 1870s (DNRW 2006). The majority of land tenure within the surrounding region is leasehold (about 80%) with the remainder comprising freehold, reserves and other tenures in small parcels of land (ANARA 2009). At present, the majority of leasehold land is used for cattle grazing, though lands within the western parts of the region also support sheep grazing (DNRW 2006). Most (94%) of the Desert Uplands bioregion is grazed and this area has not changed appreciably in recent decades (ACRIS 2008).

The so-called “Galilee Basin” extends across the eastern part of the region. Coal measures within this area, which includes the proposed mine site, are subject to a variety of new mining proposals. This includes the “Alpha Coal” and “Kevins Corner” projects proposed by Hancock Coal. and the “Carmichael” project proposed by Adani (both are located adjacent and the north of the study site), as well as the “South Galilee Coal Project” proposed by AMCI Pty Ltd and Alpha Coal Pty Ltd (located adjacent and to the south of the study site).

Approximately 160 kilometers to the east of the study site is Emerald, a regional centre for both coal mining operations of the southern Bowen Basin and significant areas of pastoral and agricultural land uses.

## 1.5. Study Site and Ecological Context

As noted previously, Glen Innes station, within the central sector of the study site, supports the Bimblebox Nature Refuge (BBNR). SL2003 No.82 provides the following description<sup>1</sup>:

“The nature refuge supports —

- (a) 6 regional ecosystems, including poplar box and silver-leaved ironbark woodland; and
- (b) a large area of intact habitat in a landscape that has been subjected to widespread clearing; and
- (c) a diverse range of herbaceous species.”

The BBNR is classified as an Environmentally Sensitive Area (ESA) (Category C Nature Refuge) within the Department of Environment and Resource Management's (DERM) ESA mapping. In addition, the DERM mapping identifies a number of small areas identified as Category B ESAs, being Endangered Regional Ecosystems (REs). These are principally associated with relatively small patches of RE 10.4.3 (*Acacia harpophylla* &/or *Eucalyptus cambageana* open woodland).

BBNR forms the eastern extent of a large remnant of native woodland which extends from the western boundary of the study site. The study site, east across parts of the Cavendish and Lampton Meadows properties.

Other notable ecological values located within the study site include:

- A large remnant of eucalypt open woodland and several small open woodland patches located within the south-eastern sector and scattered along sections of the eastern boundary;
- Eucalypt open woodland and lancewood woodland on sandstone plateaus and scarps within the north-west corner; and
- Relatively narrow and linear areas of riparian woodland (where hollow-bearing trees are often common) associated with downstream sections of the Lagoon Creek system (north-eastern parts of the study site).

Regional Ecosystem (RE) mapping by DERM (2009a) describes the extent of a possible total of 21 REs occurring within the study site. The diversity of REs has been confirmed by previous field assessments, with only relatively minor ground-truthed differences detected in the extent of DERM-mapped remnant vegetation (Worley Parsons 2009; Unidel 2011a).

The study site is contained within the south-eastern part of the Desert Uplands Bioregion (Province 2, Alice Tablelands) (Morgan 1999). The Desert Uplands Bioregion (DUB) lies within the eastern margin of the Great Artesian Basin. The DUB covers an area equivalent to about 4% of Queensland, has a semi-arid climate, of variable rainfall<sup>2</sup> (though summer dominant), and generally supporting soils of poor structure and low fertility (clay soils, sands and massive earths, and skeletal soils) (Morgan 1999; ANRA 2009).

<sup>1</sup> *Nature Conservation Legislation Amendment Regulation (NO. 1) 2003.*

<sup>2</sup> Average annual rainfall in the DUB varies from 480 mm in the north-west to 540 mm in the south-east. The rainfall is summer dominant, though with a high annual variability. Shires within the DUB have been drought declared for approximately one year in four since 1964, with the Jericho Shire averaging “drought conditions” one year in five (EPA 2002).

The sands and massive earths support eucalypt woodlands such as ironbark (*Eucalyptus whitei*, *E. melanophloia*, *E. crebra*), box (*E. populnea*, *E. brownii*), bloodwoods (*Corymbia* spp.) and yellow jacket (*E. similis*), which make up about 86% of the bioregion (ANRA 2009). Vegetation types characteristic of skeletal soils (on ranges, plateaus, scarps, etc.) are dominated by eucalypts, (e.g. narrow-leaved ironbark (*Eucalyptus crebra*)), bendee (*Acacia catenulata*) and lancewood (*A. shirleyi*) (Morgan 1999; ANRA 2009). Clay soils support brigalow (*Acacia harpophylla*), Dawson River gum (*Eucalyptus cambageana*), gidgee (*A. cambagei*) and blackwood (*A. argyrodendron*) (ANRA 2009). The study site is characterised by vegetation types associated with the sands and massive earths, though comparatively smaller areas of vegetation types are associated with skeletal soils (north-west corner) and clay soils (see Worley Parsons 2009; Unidel 2011a).

Two significant internal drainage basins in the centre of the region form the catchments of Lake Galilee and Lake Buchanan (respectively 115klms and 190klms to the north of the study site). These brackish lakes fill only as a result of above average wet seasons (ANRA 2009). Both wetlands are large, relatively shallow, and brackish, contained with internal drainage systems, are seasonally important habitat and refuge for water birds, and listed as wetlands of national significance (ANCA 1996<sup>3</sup>).

ANRA (2009) describes the most common threatened vegetation types as eucalypt woodlands with a shrubby understorey, followed by brigalow (*Acacia harpophylla*) forests and woodlands and eucalypt woodlands with a grassy understorey. Approximately 40% of the threatened ecosystems occur on alluvial land types with the majority of the remainder on clay downs (ANRA 2009). The major threatening process for threatened ecosystems is grazing followed by broadscale tree clearing (ANRA 2009).

Although the avifauna of the Desert Uplands is typical of tropical woodlands across northern Australia, it appears to contain the last substantial population of the southern subspecies of Black-throated Finch (ANRA 2009). That report also notes that there are few introduced species in the bioregion, but there have been significant declines in the reporting rate of many woodland taxa and ground feeding insectivores. This may be related to the extensive land clearance that has occurred in recent decades (ANRA 2009).

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<sup>3</sup> The *Directory of Important Wetlands in Australia* was a cooperative project involving the Australian, state and territory governments and maintained up until 1996. To be considered nationally important, a wetland must meet a set of criteria, including biogeographic representativeness; important ecological or hydrological functions; provision of animal habitat during times of vulnerability or adverse conditions; support for more than 1% of the national population of any taxa; support for threatened taxa or communities; and historical or cultural significance.

## 2. Assessment Methodology

### 2.1. Existing Information Reviews

Existing information regarding the potential presence of BTF on the study site and surrounding area was collated and reviewed. The following provides a summary of the resources reviewed as part of the preparation of this report.

#### 2.1.1. Database Searches

Searches of public-access databases were undertaken to locate previous records of the BTF within the wider area surrounding the study site. Databases included:

- Department of Environment and Resource Management (DERM) - WildNet Wildlife Online, including specific reports for: Barcaldine Regional Council LGA, Longreach Regional Council LGA; Blackwood National Park, Cudmore NP, Cudmore Resource Reserve, Epping NP, Forest Den, NP, Mazeppa NP, Narrien Range NP, Moorinya NP, Great Basalt Wall NP; Dalrymple NP; and White Mountains NP.
- Department of Environment, Water, Heritage and the Arts (DEWHA) – on-line Protected matters search tool<sup>4</sup>;
- Birds Australia – Birds Australia Atlas bird lists (Birdata); and
- Eremaea Birds<sup>5</sup>.

It is understood that the BTF Recovery Team also maintains a database of BTF records, though the details of those records are not available to the public.

#### 2.1.2. Reports and Literature

Records of the BTF were sought through a review of publicly available assessment reports prepared as part of surveys in the southern sector of the Desert Uplands Bioregion. The review of these reports also provided information on habitat type and condition. These documents included the following:

- Survey and habitat assessment reports for the study site: Worley Parsons (2009) and Unidel (2011a). A bird list for BBNR was also included in the review (Bimblebox Nature Refuge 2011).
- Survey and habitat assessment reports for the surrounding area: AARC (2004); GHD (2010); AARC (2010); and Unidel (2011b).
- Bioregional assessment reports: Morgan (1999); Morgan *et al.* (2002); and ANRA (2009).

#### 2.1.3. Species Ecology and Distribution

A review of the existing information of the life history, biology and distribution of the BTF included, but was not limited to, the following resources: Zann (1976), Immelmann (1982); Blakers *et al.* (1984); Storr (1984); Mitchell (1996); NSW NPWS (1999); Schodde and Mason (1999); Garnett and Crowley (2000); Ley and Cook (2001); Beruldsen (2003); Barrett *et al.* (2003); BTFRP (2004); NSW DECC (2005);

<sup>4</sup> This database is partially predictive, and may not provide verified observations or records.

<sup>5</sup> Eremaea Birds is an on-line birding atlas and database, built from lists provided by contributing members.

TSSSC (2005); Higgins *et al.* (2006); BTFRP (2007); DEWHA (2009 a & b);DERM (2011); and DSEWPC (2011).

#### **2.1.4. Habitat and Vegetation**

Existing information regarding the type and extent of the site and surrounds was drawn from the following sources:

- DERM's on-line Regional Ecosystem mapping database, Moratorium Vegetation mapping database, and Essential Habitat mapping database;
- Historical aerial photography and current Google satellite imagery; and
- Vegetation assessment reports pertaining to the study site (Worley Parsons (2009) and Unidel (2011a)) and surrounding area (AARC (2010)).

### **2.2. Field Investigation Program**

The field investigation program undertaken for this report was guided by previous BTF survey experience and with reference to the guidelines provided within the background paper for EPBCA Policy Statement 3.13 (DEWHA 2009b).

#### **2.2.1. BTF Survey Program**

The survey program was undertaken during May 2011 in two discrete events, i.e. 11 to 15 May (inclusive) and 30 to 31 May (inclusive). The survey program was designed (and implemented) with reference to the survey guidelines provided in DEWHA (2009a and 2010). All field surveys were undertaken by highly practiced field investigators with experience in BTF surveys, i.e. Lindsay Agnew (LA), and Dr. Ed Meyer (EM). The BTF field survey program comprised the following key components:

- active roaming searches throughout potentially suitable habitats;
- slow driving transects surveying road-side habitats;
- passive point surveys at potential drinking points; and
- systematic searches for BTF nests throughout potentially suitable habitats.

The 2011 late summer period was characterised by rainfall well above average. There were numerous locations on the study site where surface water provided potential BTF drinking points. Given the extent of surface water on the study site, only a sub-set of these were subjected to field surveys. These areas were selected on the basis of a combination of the following:

- their location (those separated by more than 500m thus contributing to the widest possible site coverage);
- their character and condition; and/or
- their position, within or immediately adjacent to, habitat of potentially higher value for BTF.

Water source surveys were undertaken throughout the day, i.e. from sunrise through to sunset<sup>6</sup>. Sites selected for water source watching and habitat assessments are presented in Figure 1.1. Descriptions of the surveyed water sources are provided in Appendix A.

<sup>6</sup> Sunrise being approximately 0652hrs and sunset being 1734hrs - Computed using National Mapping Division's sunrise/set program for Alpha (-23°39'00" 146°38'00"), version 2.2, Geoscience Australia.



Active roaming searches for BTF were undertaken across a wide and representative cross-section of potentially suitable BTF habitat across the study site, though preferential treatment was given to habitats in closer proximity to water sources (e.g. within one kilometre of such water points)<sup>7</sup>. Searches were undertaken throughout each survey day, with preferential attention given to early mornings and late afternoon periods.

All potentially suitable habitats associated with the surveyed water bodies/points on the study site were subject to systematic searches for BTF nests (see Figure 2-1). Particular attention was given to searching for, and carefully scanning mature trees for hollows and nesting evidence, throughout the small tree layer (if present), and shrub layer (where present). Where it was feasible to do so, all finch-like nests were carefully examined and nest details recorded.

### 2.2.2. Habitat Assessments

Field work was undertaken to ground-truth previous vegetation mapping and assess habitat values for BTF. This work included assessment of structural complexity of vegetation (i.e. tree density, canopy cover, vertical structural complexity, and ground cover including diversity of grasses, density of grasses and height of grass cover); presence of habitat trees (hollow-bearing trees); and sources of disturbance (i.e. adjacent land-use, feral animal evidence, and weed infestation).

Assessment of the condition of all waterbodies on the study site was also undertaken. This field work also served to verify the location and condition of the important inputs to preliminary habitat modeling, e.g. extent of preferred regional ecosystems and water sources.

## 2.3. Predictive Habitat Modelling

Preliminary predictive habitat modelling was completed for the study site and was based on the approach applied in previous studies in the greater Townsville part of the BTF range (e.g. NRA (2006a & b)<sup>8</sup>; Austecology 2010). The modeling provides a means to forecast the likelihood of BTF populations occurring on a site by portioning the site into areas of high and low probability nesting habitat.

Determining the location and extent of high and low probability habitat areas is based on the proximity of preferred nesting and foraging habitat ("preferred habitat") to permanent water resources. Preferred habitat includes those regional ecosystems ("preferred regional ecosystems") as described in the Table 1 of BTFRP (2007) and complimented by those in which the BTF has been recorded in the Desert Uplands Bioregion (e.g. Morgan *et al.* 2002).

*Higher probability BTF nesting habitat* occurs where preferred habitat is present within 400m of a permanent water resource. Higher probability habitat may be regarded as crucial as it is at these sites that critical life-history stages, namely breeding and recruitment, occur (NRA 2006). *Lower probability BTF nesting habitat* occurs where preferred habitat is present between 400m to 1000m of a permanent

<sup>7</sup> Survey guidelines in the background paper for EPBCA Policy Statement 3.13 notes that targeted walk through surveys should occur within any sections of the subject land that fall within 600m of seasonal and/or permanent water sources (located on or adjacent to a site).

<sup>8</sup> NRA (2006) notes that the scope of the Nesting Habitat Model was to develop decision rules to predict the potential distribution of habitat for the BTF (southern) in the Townsville-Thuringowa Local Government Areas.

water resource. These areas may form supporting habitat and thus, included within the BTF range. Areas where preferred habitat was absent within one kilometre of a permanent water source were regarded as *improbable BTF nesting habitat*.

In regards to the above, the development of both of the abovementioned categories is underpinned by the following key assumptions:

- that within the region, nest sites within 400m of a water source are considered typical for the subspecies, with nest sites rarely more than one kilometre from permanent water during the breeding season (as per interpretations of Mitchell 1996, NRA 2006, and DEWHA 2009b).
- that only water resources that were estimated to persist for at least four months of the year or longer during the late wet season were included as a key model parameter (see Figure 2-1). The four-month water retention period is regarded as appropriate as this correlates with the period (of highest potential for breeding) required for the successful recruitment of a new generation of BTF's into the population.

In regards actual BTF presence, the model is limited to predictions of the occurrence of nesting habitat based on the presence of key habitat parameters. In practical terms, whether BTF populations actually occupy either higher or lower probability nesting habitat as mapped, will be dependent on a complex combination of current and historical factors<sup>9</sup> which necessitate consideration in assessing the value of the model mapping outputs.

Base data to develop the desktop habitat modelling was derived from a variety of sources, including:

- DERM Regional Ecosystem mapping;
- Historical aerial photography and current Google satellite imagery;
- Digital mapping data information from Geosciences Australia; and
- Vegetation assessment reports pertaining to the site (Worley Parsons (2009) and Unidel (2011a)).

Field work was undertaken specifically to test and improve the desktop habitat modelling outputs. Field work focused on verifying the location and condition of the key model inputs, i.e. extent of preferred regional ecosystems and water sources. Field work included the following:

- Ground-truthing of current extent and condition of vegetation communities/regional ecosystems on the study site. This involved visual analysis of species, density and vegetation condition/health (in the upper, mid and lower stratum) and assessment of any disturbances present (such as grazing, earthworks) that may deter BTF's from using the area, as well as the degree of understorey weed infestation (that may replace native grasses and reduce food resources to BTF's); and
- Field verification of the status of waterbodies mapped within the area surrounding the study site and type and extent of vegetation communities/regional ecosystems present.

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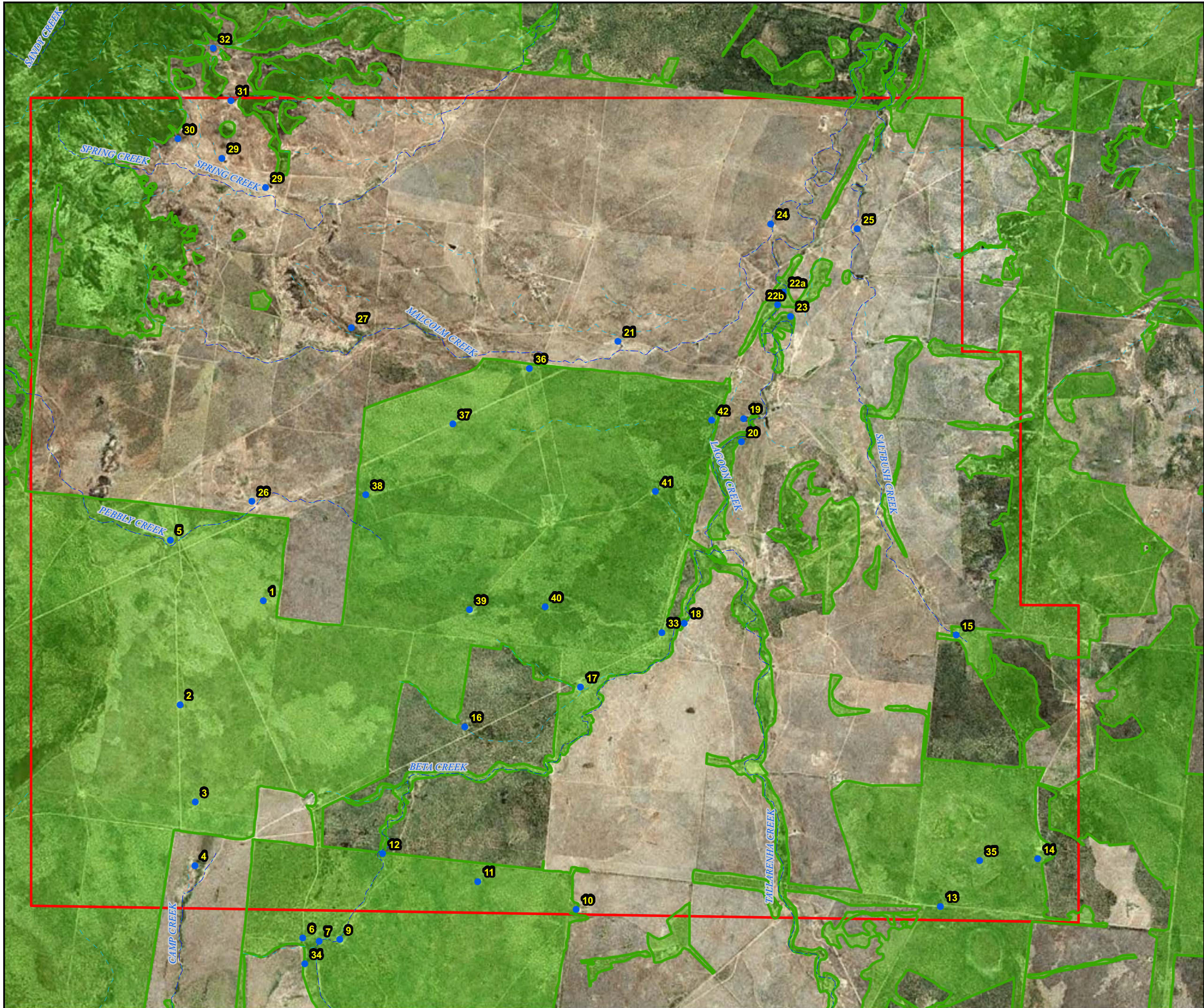
<sup>9</sup> e.g. habitat condition, area of supporting habitat, degree of population isolation/connectivity, and seasonal variability.

The outputs of predictive habitat modelling are subject to a number of assumptions and limitations. Assumptions and limitations relevant to the development of the habitat model for this report (in addition to the abovementioned assumptions) are summarised as follows:

- That the estimation of water retention periods for water sources off-site presents a limitation as the potential for an incorrect estimation exists.
- A variety of potential water sources are located on properties where either access could not be gained or water sources could not be assessed from outside the property (with the aid of binoculars). This presents a limitation as the potential to underestimate of the number of water sources exists. Conversely, there is a potential to overestimate the number of water sources due to on-ground changes which are either not evident even on the most current aerial photography or simply not evident due to constraints to visual confirmation or physical access constraints to all properties which have water sources mapped.
- Areas identified as potential BTF nesting habitat assume that the entirety of a mapped area is habitat that could be occupied by BTF's. Measures of both the carrying capacity of different habitats for BTF and BTF home range size is unknown. Therefore, whilst habitat may be present, there are potential influences which may reduce/prevent occupancy of a mapped area of potential nesting habitat (e.g. social behaviours; though these are not well known).
- Site-specific factors such as grassland condition and grass species richness have not been strongly factored into the decision parameters. It is assumed there is no variation in the quality of this component of BTF habitat. As noted previously, ground-truthing of habitat on private land in the surrounding area was constrained and this presents a limitation as the potential for incorrect or inappropriate designation of "preferred habitat" status exists.
- What constitutes a minimum viable habitat is poorly understood and it is not known what quantity and quality of supporting habitat around a nesting site is required for the breeding effort to be viable. No habitat size parameters were applied to the model.
- The viability of any given BTF population may be influenced by the degree of connectivity to other populations. Therefore, whilst habitat may be present, there are potential influences which may reduce/prevent occupancy of a mapped area of potential nesting habitat (e.g. isolation/connectivity of nesting sites) and such influences cannot be determined as part of the basic model parameters.

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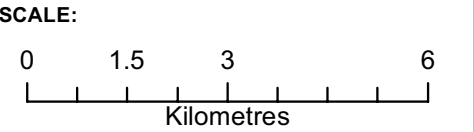
**Legend**

- Surveyed water sources which are known/likely to support water for at least 4 months
- Extent of DERM 2011 regional ecosystem mapping.
- Study Area

5 Davina Street  
Tarragindi QLD 4121  
Ph: (07) 3892 4402  
[www.austecology.com.au](http://www.austecology.com.au)



**austecology**



**DATA SOURCE:**  
Source:EPA Regional Ecosystems Digital Database, Version 6.0, 2009©  
Source:Department of Mines and Energy, Digital Database, 2011©

**CLIENT:** Waratah Coal Pty Ltd.

**PROJECT:** Black-throated Finch Survey and Habitat Assessments for EPC 1040, Galilee Basin, Central Queensland.

**TITLE:**  
Figure 2.1  
Site and Relevant Features

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### 3. Black-throated Finch Species Profile

#### 3.1. Conservation Status

The Black-throated Finch (southern) *Poephila cincta cincta* is listed as *endangered* under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA) and the Queensland *Nature Conservation Act 1992* (NCA). *Poephila cincta cincta* is also listed under the Convention on International Trade in Endangered Fauna and Flora (CITES). At the species level, the Black-throated Finch is listed as *near threatened* under the International Union for Conservation of Nature (IUCN) Red List of Threatened Species.

#### 3.2. Distribution and Abundance

The BTF was previously known from habitats extending from the Atherton Tablelands in north Queensland, to the Northern Tableland and north-west slope regions of New South Wales (Higgins *et al.* 2006). Over the last 20 years<sup>10</sup>, it is estimated that the extent of occurrence of the subspecies has contracted by approximately 80% of its former extent (BTFRP 2007)<sup>11</sup>. It has been postulated that circumstantial evidence suggests, concomitant with the known contraction in extent of occurrence, an overall decline of 50% in the population of this species has occurred in the past ten years (BTFRP 2007; DSEWPC 2011). The northern extent of current distribution extends north-easterly from the Burdekin-Lynd Rivers divide towards Ravenshoe, and along which, there is an intergrade zone between the white-rumped form (*Poephila cincta cincta*) and black-rumped form (*P. c. atropygialis*) (Schodde and Mason 1999).

It appears that the southern subspecies is now confined to the northern part of its former range, i.e. at least north of Rockhampton (BTFRP 2007; DSEWPC 2011). The BTF has been regarded as locally common at a number of rural and semi-rural sites around Townsville and Charters Towers (DEWHA 2009a; DSEWPC 2011). Other locations where birds have been reported as regularly observed are scattered through the Northern Brigalow Belt (south of Townsville) and Desert Uplands (southwest of Townsville) (BTFRP 2007). There are also records within the last 10 years from the Einasleigh Uplands and wet tropics bioregions (BTFRP 2007).

Figure 1 of the EPBCA Policy Statement 3.13 (DEWHA 2009a), maps important areas for BTF<sup>12</sup> within the Cairns to Rockhampton component of its known range (based on available information at the time of publication; DEWHA 2009a). Of relevance to this project, is a series of "important areas", largely extending north from about Aramac and closely associated with the Pentland-Aramac Road.

<sup>10</sup> Comparison of records from the 1<sup>st</sup> bird atlas (Blakers *et al.* 1984) with those of the 2<sup>nd</sup> bird atlas project (Barrett *et al.* 2003).

<sup>11</sup> In 2005, TSSC (2005) concluded that the extent of occurrence had declined by up to 59% in the preceding decade.

<sup>12</sup> DEWHA (2009a) notes – "The important areas for black-throated finch (southern) are defined as the habitat within five km of post-1995 sightings of the black-throated finch (southern). These areas are likely to contain the critical habitat configuration between water sources, grasslands and nesting trees."

The BTFRP (2007) notes the following in regards to BTF occurrence within the Desert Uplands Bioregion:

- The Desert Uplands is one of four bioregions within Queensland which support post-1998 BTF records. Highlighted locations are Aramac, Yarrowmere, Moonoomoo, Fortuna (A. Kutt, *pers comm.*) and Doongmabulla (S. Pollock *pers comm.*)
- That “Records from the last 20 years in southern and central Queensland have been on either road reserves or freehold land”.
- Very few black-throated finches have been reported south of Clermont or Aramac in Queensland (23°S) since the late 1970s (Blakers *et al.* 1984).

### 3.3. Habitat Requirements

The BTF is known from a variety of grassy savannah woodland habitats dominated by *Eucalyptus* and/or *Corymbia*, though also woodlands dominated by *Melaleuca* and/or *Acacia* tree species and grasslands comprised of genera such as *Astrebla*, *Dichanthium* or *Panicum* (Higgins *et. al.* 2006; BTFRP 2007; DSEWPC 2011). Within these habitats, BTF require access to three key resources for survival and breeding, i.e. water sources, seeding grasses, and suitable nesting habitat. The presence and configuration between and within these three key resources governs the distribution of the subspecies (DEWHA 2009b). Within the northern part of its distribution, the BTF is thought to require a mosaic of different habitats in which it can find seed during the wet season (Mitchell 1996; BTFRP 2007).

#### 3.3.1. Regional Ecosystems

In north Queensland, the BTF has been recorded in 17 regional ecosystems (as described in the Regional Ecosystem Description Database (REDD) (BTFRP 2007). Within the Desert Uplands Bioregion, which encompasses the study site, the subspecies has been recorded in eight regional ecosystems (Morgan *et al.* 2002; BTFRP 2007), i.e.:

- RE 10.3.6 – *Eucalyptus brownii* open woodland on alluvial plains;
- RE 10.3.9 – *Eucalyptus whitei* open woodland on sandy alluvial fans;
- RE 10.3.13 – *Melaleuca fluviatilis* and/or *Eucalyptus camaldulensis* woodland along watercourses;
- RE 10.3.28 – *Eucalyptus melanophloia* or *E. crebra* open woodland on sandy alluvial fans;
- RE 10.4.8 – *Dichanthium sericeum* and/or *Astrebla* spp. and/or *Panicum laevinode* tussock grassland on Cainozoic lake beds;
- RE 10.5.1 – *Eucalyptus similis* and/or *Corymbia brachycarpa* and/or *Corymbia setosa* low open woodland to open woodland on sand plains;
- RE 10.5.5 – *Eucalyptus melanophloia* open woodland on sand plains; and
- RE 10.7.11 – *Eucalyptus melanophloia* low open woodland on ferricrete.

#### 3.3.2. Feeding Resources

Black-throated Finches (southern) are predominantly granivorous, mainly feeding on fallen grass seed or by taking seeds from seed-heads whilst on the ground (Higgins *et. al.* 2006). It may, like its congener, *Poephila cincta atropygialis* (northern subspecies), also feed on insects and their larvae, including flying termites (see observations in Immelmann 1982; Smedley 1904; Zann 1976). BTFs mostly forage on the ground, often on bare or open ground, with the majority of foraging activities occurring during early morning and then late afternoon (*pers comm.* John Young,



2010). There are numerous observations of birds feeding along edges of clearings (e.g. graded firebreaks, unsealed roads) adjacent to intact habitat areas where suitable seeding grasses exist (Mitchell 1996; DEWHA 2009b; *per obs.* author).

Whilst there is limited data on the diet of the subspecies, native perennial grasses which are thought to predominate in the diet include: *Enteropogon acicularis*, *Panicum decompositum* (native millet), *Panicum effusum* (hairy panic), *Dichanthium sericeum*, *Alloteropsis semialata* (cockatoo grass), *Eragrostis sororia* (lovegrass) and *Themeda triandra* (kangaroo grass) (Mitchell 1996; DEWHA 2009b). In the Townsville region, seeds of the introduced species *Urochloa mosambicensis* (sabi grass) and *Digitaria ciliaris* (summer grass) were also considered to be prominent in the diet (Mitchell 1996). Other sources, including introduced grass species, are *Schizachyrium spp*, *Echinopogon sp*, *Sorghum spp* and *Paspalum sp* (Mitchell 1996; DEWHA 2009b). There are no known studies of the foraging ecology of the BTF within the Desert Uplands Bioregion.

Foraging habitat, movement patterns and dietary preferences are thought to vary seasonally with changing food availability. During the breeding season when seeding grasses are abundant, finches may undertake only localised foraging movements proximate to nest sites. As the dry season develops, grass seed abundance declines, and individuals must forage more widely (up to three kilometres) (Mitchell 1996).

The dependence on a diet dominated by grass seed means that the BTF requires year-round (daily) access to seeding grass species. In the greater Townsville area, there is believed to be a critical foraging resource bottleneck at the start of the wet season (November–December) when existing fallen seed germinates, but new seed has yet to be produced (NRA 2007 in DEWHA 2009b). Thus, the availability of grass species which produce seed early in the wet season (typically early flowering perennials) is likely to be crucial for the survival of the subspecies in the area. It is unclear whether a similar scenario is relevant for BTF in the Desert Uplands Bioregion.

### **3.3.3. Water Sources**

Like other seed-eaters, the BTF requires daily access to water, at least daily, though presumably with increased frequency throughout the day during drier periods. Whilst there have been no detailed studies on drinking behaviors of the BTF, such behaviour may be similar to the recorded habits of its congener *Peophila c. atropygialis*, i.e. drinking by sucking (thus able to drink from a variety of locations such as perches, rims of water troughs, etc.); drinks in the morning and before sunset, drinks early morning during drier conditions; and with drinking times potentially more variable when water is abundant (see Immelmann 1982; Zann 1976). BTF are known to use both natural and artificial water sources (BTFRP 2007). These include wetlands, creeks, dams, and stock troughs.

### **3.3.4. Breeding**

The proximity and connectivity of the nesting resources to water and foraging habitat is considered to be critical in the choice of nesting sites (DEWHA 2009b). In the Townsville region, nest sites within 400m of a water source are considered typical for the subspecies, with nest sites rarely more than one kilometre from permanent water during the breeding season (NRA 2006 in DEWHA 2009b).

BTFs are known to nest in a variety of locations, including hollow tree limbs, pendulous tree branches, within clumps of mistletoe, at the base of active raptor nests, within old babbler nests, tree stags, at the base of dried pandanus leaves, and bushy shrubs (Beruldsen 2003; Higgins *et al.* 2006; *pers comm.* John Young, 2010; *pers. obs.* author). BTFs may form loose colonies and multiple nests may be located within a single tree or in adjacent trees within the colony, often less than 50m from other nest trees (DEWHA 2009b; *pers comm.* John Young, 2010; *pers. obs.* author).

Nests are typically constructed with grass stems and feather or plant down lining, and are used for breeding and roosting (Higgins *et al.* 2006). They are usually built at least four metres above the ground and in the fork or hollow branch of a tree (Beruldsen 2003; Higgins *et al.* 2006; DEWHA 2009b), though can be as low as 1.5m above ground (Zann 1976).

Whilst BTFs are known to breed throughout the year under optimal conditions (Storr 1984; Higgins *et al.* 2006), in the Townsville area, breeding typically occurs during the wet season, usually between February and May (Mitchell 1996; DEWHA 2009b).

The minimum area of nesting habitat required to sustain a viable breeding colony is unknown (DEWHA 2009b). Based on observations of a single colony, it has been suggested that a minimum remnant habitat patch of 40–50ha within 500m of a nesting colony may be required for that colony to remain viable (NRA 2006 in DEWHA 2009b). In the Townsville area, most known nesting colonies are connected to larger areas of remnant vegetation (DEWHA 2009b), though in the Giru area, colonies are known to have established on the edges of extensive areas of cane field and with the larger remnants >1.2km away (*pers comm.* John Young 2010; *pers. obs.* author).

There are no measures of breeding success (Higgins *et al.* 2006).

### **3.3.5. Minimum Habitat Area Requirements**

Measures of both the carrying capacity of different habitats for BTF, BTF home range size, and what constitutes a minimum viable habitat for BTF is unknown. The total area of habitat required for population viability is likely to vary from site to site and seasonally in response to factors such as the composition, density and condition of surrounding grasslands, and by the degree of patch isolation/connectivity.

### **3.3.6. Habitat Connectivity**

The BTF is typically associated with large patches of remnant vegetation, though also where suitable seeding grasses exist in areas adjacent to intact habitat. The availability and relationship between the key habitat resources regulates its distribution and any disruption to the connectivity between these resources is likely to have a serious impact on an area's ability to sustain BTF populations (DEWHA 2009b). In the Townsville area, most known nesting colonies are connected to larger areas of remnant vegetation (DEWHA 2009b). The BTF has also been recorded flying across roads and rivers (*pers comm.* John Young 2010) and appears to be capable of travelling over uninhabitable sites if the distance is less than a kilometre (NRA 2007 in DEWHA 2009b).

### 3.3.7. Movements

The BTF is considered to be a sedentary or resident bird (Higgins *et al.* 2006; DEWHA 2009b). Around Townsville and Charters Towers, the BTF is considered resident (Britton and Britton 2000; Garnett and Crowley 2000). However, there are observations which show that the subspecies can be highly mobile, at least during non-breeding periods (Mitchell 1996), or in response to drought to seek out available water sources (Passmore 1982; Mitchell 1996; Ley and Cook 2001; Higgins *et al.* 2006). High mobility may also provide some means of adapting to seasonal variability in the food source.

The greatest distance that a BTF (as part of daily movements) has been recorded to have moved is 3.2 kilometres and this was between a breeding area and a non-breeding area (Mitchell 1996). Mitchell (1996) observed that single daily movements of over 1.5 km may be part of the species' normal daily routine for at least some parts of the year. These larger scale movements are most likely to occur during the drier months of the year when birds are no longer breeding (and when there is a potential advantage in forming flocks to find food during less optimal seasonal conditions).

During the breeding season, birds typically make only small daily movements between foraging habitat and within close proximity to the nesting site (Mitchell 1996; Higgins *et al.* 2006; DEWHA 2009b). In contrast, movements may increase up to three kilometres per day during the non-breeding period (Mitchell 1996). Whilst there is some evidence of local movement away from sites once the breeding period is complete, BTF are still encountered (though at a reduced frequency) at their breeding sites during the non-breeding period, suggesting that birds may remain around their nest sites during the non-breeding period, and forage more widely throughout the surrounding habitat (Mitchell 1996; DEWHA 2009b).

### 3.3.8. Modified Landscapes

The BTF is very rarely observed in modified habitats (e.g. gardens, yards or heavily grazed paddocks) (DEWHA 2009b). However, there are numerous observations of birds feeding along graded firebreaks, grassy unsealed roadsides, beneath power lines or in rail corridors where suitable seeding grasses exist and are adjacent to intact habitat areas (Mitchell 1996; DEWHA 2009b; *pers comm.* J. Young 2010).

## 3.4. Threatening Processes

The growth of pastoralism in the early 20<sup>th</sup> century, and especially the overgrazing of riparian grassland (core habitat), is regarded as a major contributor to the contraction at the southern end of its range in NSW (Garnett and Crowley 2000; BTFRP 2007). There has been a less extreme effect in the northern part of its range where clearing has not yet been so widespread, and grazing is predominantly by cattle (*cf.* sheep grazing in southern part of former range) (BTFRP 2007).

Within the northern extent of its range, the subspecies now appears to be in decline and possible threats are considered relevant, though relative importance of these threats is currently unknown. Potential threats include (after BTFRP 2007):

- clearing and fragmentation of woodland, riverside habitats and wattle shrubland;
- degradation of habitat by domestic stock and rabbits, including alterations to fuel load, vegetation structure and wet season food availability;
- alteration of habitat by changes in fire regime;

- invasion of habitat by exotic weed species, including exotic grasses;
- illegal trapping of birds;
- predation by introduced predators; and
- hybridisation with escapees of the northern subspecies.

The relatively sedentary lifestyle of the BTF is considered to significantly increase its vulnerability to disturbance, or modification, of any of its three key resources (i.e. water sources, seeding grasses; and trees providing suitable nesting habitat) (DEWHA 2009b).

## 4. Findings and Discussion

### 4.1. Review of Existing Information

It is apparent from the review of existing information that there have been no systematic or regular surveys in regards to BTF in the Desert Uplands, with most data derived opportunistically and descriptive in nature. In considering the information available at the time of preparing this report, it is clear that there is insufficient information for adequate conservation planning for BTF the bioregion.

#### 4.1.1. Surrounding Area

Figure 1 of the EPBCA Policy Statement 3.13 maps important areas<sup>13</sup> for BTF (DEWHA 2009a). Of relevance, there is a series of mapped “important areas” extending north from about Aramac and closely associated with the Pentland-Aramac Road. These 10 mapped locations are situated within in an arc extending approximately 100 to 200 kilometers north-west to due north of the study site.

Searches of the DERM WildNet Wildlife Online database for the area surrounding the study site (an area of approximately 107,000 square kilometers<sup>14</sup>), provided five confirmed/verified BTF records<sup>15</sup> for the Barcaldine Regional Council LGA search area only. Specific reports for Longreach Regional Council LGA and a variety of National Parks and Resource Reserves provided a null result (e.g. Blackwood National Park, Cudmore NP, Cudmore Resource Reserve, Epping NP, Forest Den, NP, Mazeppa NP, Narrien Range NP, Moorinya NP, and White Mountains NP).

To the near north of Charters Towers, there is one DERM BTF record for the Great Basalt Wall National Park (approximately 85 kilometers west-north-west of Charters Towers) and one DERM BTF record for Dalrymple National Park (approximately 30 kilometers north of Charters Towers). In this northern part of the search area, Figure 1 of DEWHA (2009a) also maps three BTF “important areas” to the near east of Hughenden.

All of the abovementioned record locations are identified on Figure 4-1.

A series of fauna surveys were undertaken on the Clermont Mining leases<sup>16</sup>. The AARC (2004) report noted that potential habitats for species of conservation significance (though BTF not explicitly cited) were specifically targeted in the survey program during 2001 and 2002. Whilst a significant proportion of that survey site had been cleared for cropping and grazing, the majority of the site supported remnant

<sup>13</sup> Important Areas were derived from a 5km buffer of reliable post 1995 records. Records are from the DEWHA - Species Profile and Threats Database (DEWHA 2009).

<sup>14</sup> Search area generally bounded by: Longreach, Barcaldine, and Aramac in the west; Hughenden, the Flinders Highway, and Charters Towers in the north; the Gregory Development Road, Clermont, and Emerald to the east; and Jericho, the Capricorn Highway, and Alpha to the south.

<sup>15</sup> The DERM WildNet Wildlife Online database does not provide any further details for a record (e.g. date, specific location, whether the record represents one or more individuals, etc.). Such record details are not available to the public.

<sup>16</sup> Approximately 125klms north-east of the study site and to the near east of the existing Blair Athol mining operations

vegetation communities (including communities considered to be potentially suitable for BTF). No BTF were recorded from the surveys<sup>17</sup>.

Recently, an extensive area (over 50,000ha), adjacent and to the north of the study site, has been subjected to a comprehensive fauna survey program (the Alpha Coal Project; AARC 2010). The field program comprised eight surveys events between June 2008 and June 2010. Each of the eight surveys included dedicated searches for diurnal birds and BTF was noted as being a target species for this work (though it is not clear if dedicated BTF surveys were included in the field program). The spread of surveys appears to have adequately covered the potential seasonal variation during the two year survey period. No BTF were recorded, though the report indicated that potentially suitable habitat did occur on the site<sup>18</sup>.

The author is aware of two other sites within the surrounding area which are currently subject to fauna surveys and habitat assessments. These are the Carmichael Coal project (approximately 130klms due north of the study site), and the South Galilee Coal project (to the near south of Alpha). At the time of preparing this report, no further information on these surveys was available to the author.

The author has been provided with personal records from several observers (additional to the abovementioned records). These together with the previously cited records, are presented in Figure 4-1.

#### 4.1.2. Study Site

There are no areas mapped by DERM as Essential Habitat for BTF (or other threatened fauna species) within the study site. It is understood that the BTF Recovery Team maintains a database of BTF records, though these records are not available to the public.

In regards to the study site, two fauna survey programs have been documented (Worley Parsons 2009; Unidel 2011a). The field survey for Worley Parsons (2009) focused on the BBNR, provided two days of general fauna survey in May 2009. During 2009/2010, a fauna survey program was implemented across the study site and included an 8-day field program in October 2009 and a 12-day program in April 2010 (Unidel 2011a). Both these studies included dedicated morning and afternoon surveys for diurnal birds, and the timing and field conditions for these surveys seem suitable for the detection of BTF. Whilst the BTF was included as part of the relevant suite of threatened fauna for consideration in both reports, it is not clear if that consideration included targeted field surveys for BTF. Neither the Worley Parsons nor the Unidel surveys detected BTF on the study site.

The author is aware of a putative record of BTF from the BBNR (May 2011) and has sought confirmation and record details. At the time of preparing this report, no further information on the BBNR record has been made available to the author.

The BBNR website<sup>19</sup> notes that a long-term bird monitoring program has been implemented by Birds Australia on the BBNR to monitor trends in avian diversity due to climate change and land use within the site's eucalypt woodlands. A list of birds

<sup>17</sup> Double-barred Finch (*Taeniopygia bichenovii*) was the only finch species recorded during site surveys.

<sup>18</sup> Plum-headed Finch (*Neochmia modesta*), Zebra Finch (*Taeniopygia guttata*), and Double-barred Finch (*T. bichenovii*) were the only finch species recorded, and all were regarded as "locally common".

<sup>19</sup> [http://bimblebox.org/?page\\_id=41](http://bimblebox.org/?page_id=41), accessed 3 June 2011.

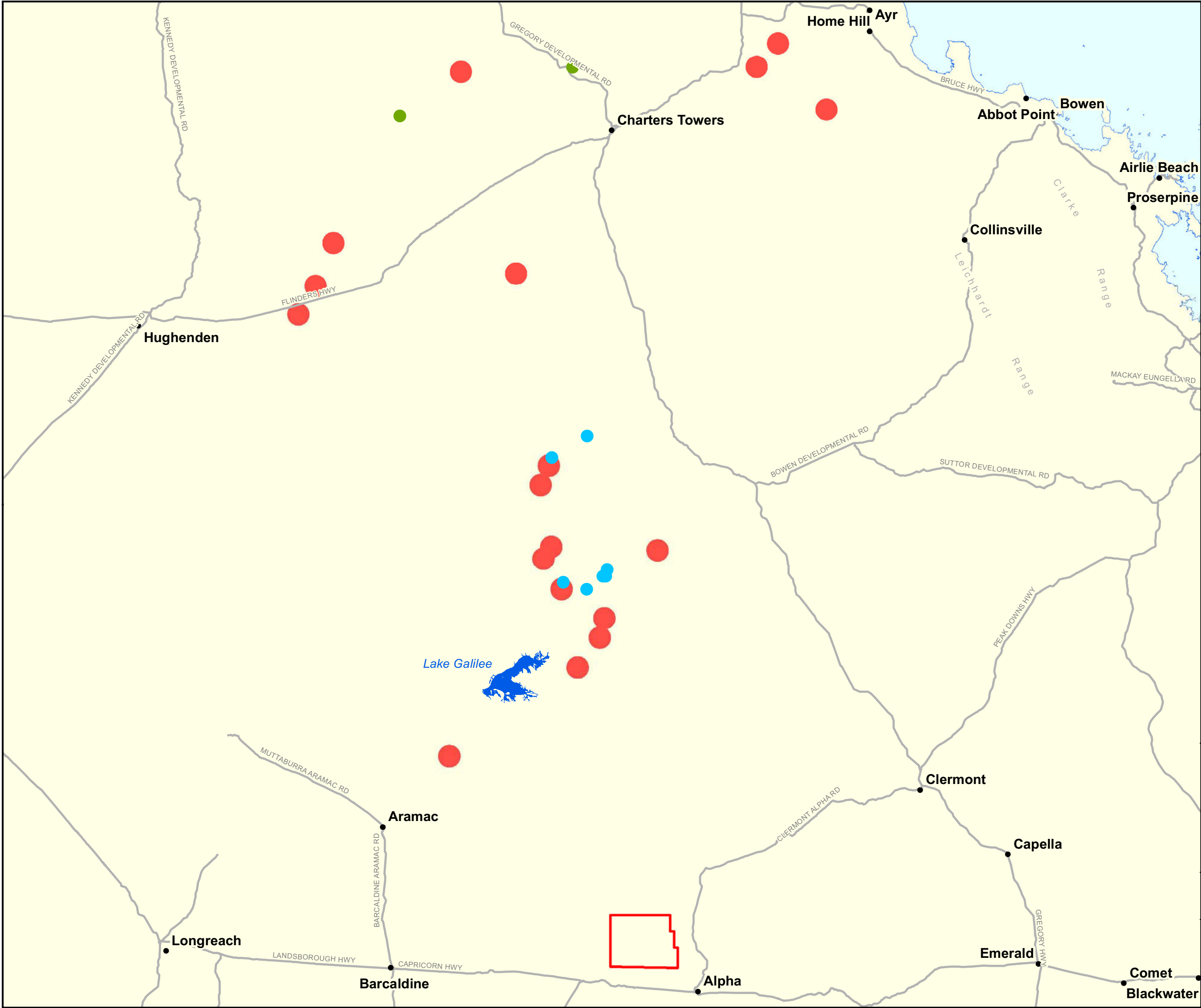
recorded by Birds Australia during the period 2003 to October 2010 is also provided on the BBNT website<sup>20</sup>. That list includes the Plum-headed Finch (*Neochmia modesta*), Zebra Finch (*Taeniopygia guttata*), and Double-barred Finch (*T.bichenovii*), though there is no record of the BTF. At the time of preparing this report, no further information on the Birds Australia surveys have been made available to the author (though such information has been sought).

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<sup>20</sup> The 2003-2010 bird list has been incorporated within the bird database included within this report.

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**Legend**

-  Important Areas (from EPBCA Policy 3.13 Figure 1,DEWHA 2009)
-  Personal records provided to the Author
-  DERM Wildlife-online Records
-  Study Area

5 Davina Street  
Tarragindi QLD 4121  
Ph: (07) 3892 4402  
www.austecology.com.au



**austecology**

**SCALE:**

0 15 30 60

Kilometres

**DATA SOURCE:**  
Source:EPA Regional Ecosystems Digital Database, Version 6.0, 2009©  
Source:Department of Mines and Energy, Digital Database, 2011©

**CLIENT:** Waratah Coal Pty Ltd.

**PROJECT:** Black-throated Finch Survey and Habitat Assessments for EPC 1040, Galilee Basin, Central Queensland.

**TITLE:**  
**Figure 4.1**  
**Black-throated Finch Records for Surrounding Area**

**DATE:** 09-06-11 **SIZE:** A3

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## 4.2. Site Survey and Assessment Results

### 4.2.1. Bird Surveys

The field program provided 14 survey-person days (i.e. two persons for seven days) during late-wet season conditions. Field coverage of the study site was considered extensive. A total of 126 native bird species were recorded (see Appendix C).

These records included three finch species, the Plum-headed Finch (*Neochmia modesta*), Zebra Finch (*Taeniopygia guttata*), and Double-barred Finch (*T.bichenovii*). There were no records of the Black-throated Finch (southern).

Of the three finch species recorded, the Double-barred Finch was the most regularly encountered species. Both Double-barred Finches and Zebra Finches were found to be widely distributed throughout all of the remnant woodland and remnant regrowth habitats surveyed. Flocks of Plum-headed Finches (one flock estimated to at least 300 birds) were also regularly recorded, though their distribution was more restricted in comparison with that observed for the other two finch species. Mixed finch flocks were also commonly recorded<sup>21</sup>.

### 4.2.2. Nest Searches

As described previously, searches for finch nests were conducted within the surrounds of a wide variety of water points (42 sites; see Figure 2-1 and Appendix A), though also sought opportunistically during habitat transects, etc. A total of 72 finch nests were located during the survey program. The following provides a summary of this result:

- A total of 40 nests were considered to be those of the Double-barred Finch.
- Six nests were identified as those built by the Zebra Finch.
- 16 nests, whilst in a largely intact state, could not be attributed to a particular finch species, though were regarded as grassfinch nests.
- Vestigial remains of 10 nests were recorded. These could not be attributed to a particular finch species, though were regarded as grassfinch nests.
- The majority of the recorded nests were located at sites between 1.5 and 2m above ground.
- The lowest nest site was recorded at around 0.6m above ground (within a large, spreading *Carrissa ovata*), whilst the highest nest location was about four metres above ground (within a tall (app. 4.5m) narrow-leaved *Acacia* (*sp cf stenophylla*)).
- A significant proportion of the recorded nests were located within *Carrissa ovata* and *Bursaria spinosa*, though nest sites were also recorded within *Eremophila mitchellii*; *Flindersia dissosperma*, and *Melaleuca nervosa*.
- Whilst hollow-bearing trees were common (and in some cases, regarded as abundant) at a wide variety of areas surveyed, no nests attributable to grassfinches were observed within tree hollows.

<sup>21</sup> More often, Zebra and Double-barred Finches; though also Plum-headed and Double-barred Finches; and less often, all three species.

#### 4.2.3. Habitat Assessments

As identified in Section 3 of this report, there are eight regional ecosystems in which the BTF has been recorded in the Desert Uplands Bioregion (Morgan *et al.* 2002; BTFRP 2007). Three of these regional ecosystems are present on the study site (REs10.3.28, 10.5.5, and 10.5.1), with RE10.5.5 (*Eucalyptus melanophloia* open woodland on sand plains) being the most widespread.

Whilst differences are evident throughout these woodland habitats (e.g. variations in both structural and floristic characteristics), there generally appears to be a potentially suitable suite of nesting opportunities for BTF throughout the broader extent of remnant vegetation cover. Given the field observations during the survey program, the extent and distribution of surface waters (of artificial or natural origin) does not appear to be a highly limiting influence on the extent of potentially suitable breeding and foraging habitat which the BTF could conceivably use (see Figure 2-1 and Appendix B).

The remaining key resource to be considered in regards to BTF habitat suitability is the availability of suitable foraging resources and conditions. Whilst a comprehensive analysis of the location, extent, and quality of ground cover foraging resources and conditions is beyond the scope of this investigation, the following general observations are provided.

Whilst the study site has, and continues to be used for grazing cattle, it is apparent that stocking rates (and grazing management practices generally) appear to vary between the various pastoral leases which are located within (or largely overlap) the bounds of the study site. Amongst other considerations which are relevant to potential habitat quality for BTF, management practices have the potential to affect ground cover/BTF foraging habitat in regards to the influence of pasture grasses (particularly Buffel Grass), and the height, density and diversity of native grass taxa.

The seeds of the introduced and invasive Buffel Grass are not known as a food source for BTF. Whilst Buffel Grass is widely distributed throughout woodland habitat on the study site, its dominance (or otherwise) of the grass layer has been observed to vary considerably. Similarly, characters such as the height and density of native grass also vary notably between habitat areas. In some areas, the grass foliage projective cover would be too dense for BTF to successfully forage on the ground<sup>22</sup>. Additional botanical assessments are required in order to provide data on grass cover characteristics. Suitable information can then be used as an additional input to foraging/breeding habitat modeling for future refinement of the BTF habitat values assessment for the study site.

At present, there is insufficient data to determine the comparative quality of habitat on the study site relative to that within the broader surrounding area. Additional investigations of the nature and condition of surrounding habitats, and continuity and connectivity will assist in the contextualization of the habitat values on the study site.

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<sup>22</sup> BTF are known to feed in more open ground cover conditions (even sparsely vegetated or bare ground) where access to ground stored seed may be easier.

In regards to habitat connectivity, the following general observations can be made:

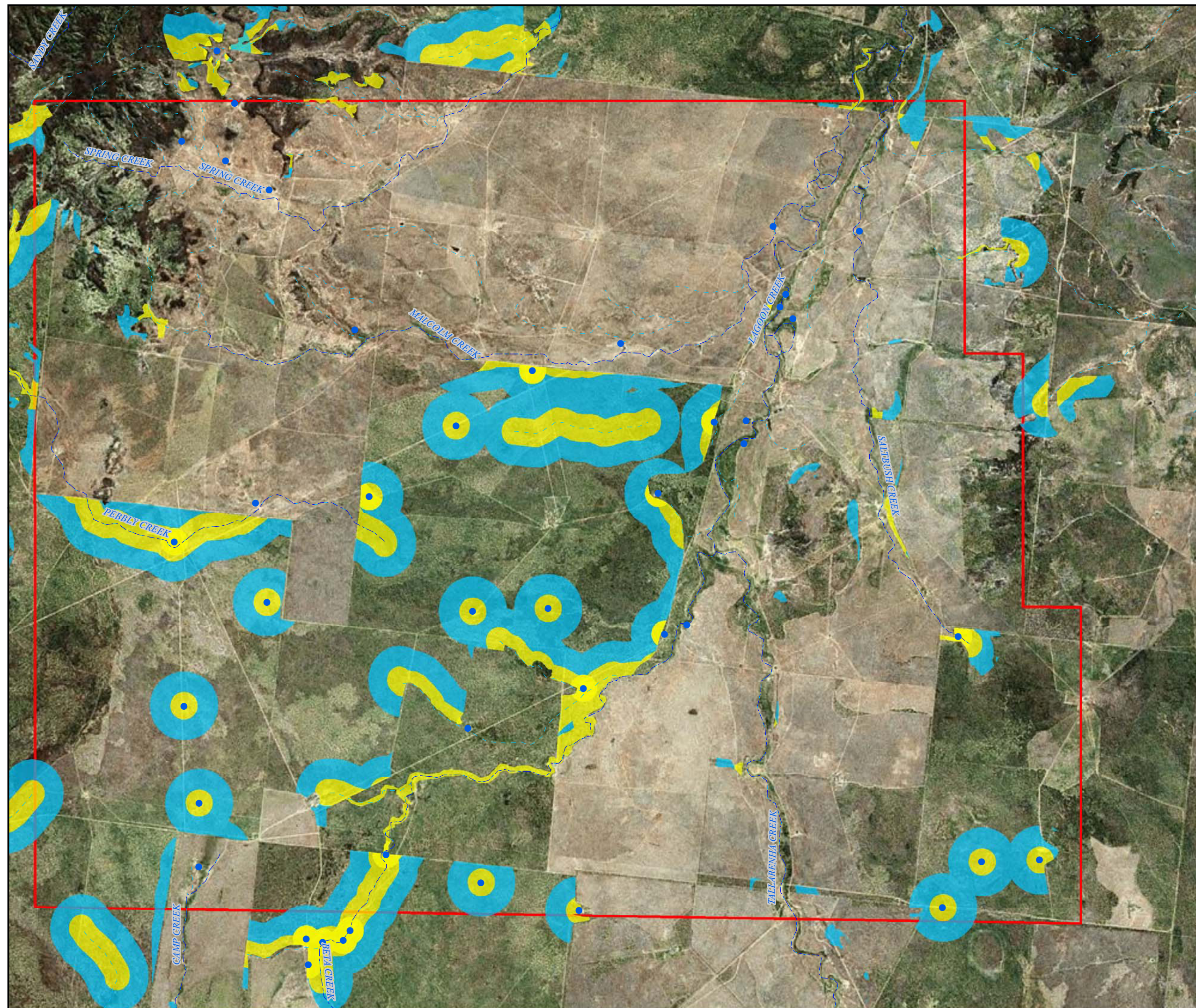
- The strongest level of connectivity between woodland habitats on the study site and woodland and other remnant vegetation cover off-site is via the south-western sector of the study site. This connects with remnant vegetation extending northwards (e.g. the Spring Creek area) and southwards.
- Whilst there is a high level of habitat fragmentation in the south-east corner of the study site, there is, in regards to BTF, a range of potential movement opportunities from the large remnant woodland patch in the south-east through to patches of remnant vegetation off-site and to the near east of the study site. From there (i.e. off-site), there are then reasonable habitat connections and mosaics which form a “band” extending northwards past the eastern side of the study site to broader areas of off-site habitat further north (e.g. remnant vegetation located on the south-eastern parts of the Hancock mining tenements).
- Movement opportunities into and out of the study site via Lagoon Creek and associated narrow linear bands of vegetation (north-eastern part of study site) are present, though are of relatively poor quality in regards to other opportunities as highlighted above.
- There are very poor habitat linkages across the majority of the northern third of the study site to habitats adjacent and to the north.

#### **4.2.4. Predictive Breeding Habitat Values Model**

Figure 4-2 provides the initial mapping output from the predictive habitat modelling. The mapping output depicts areas of potentially higher and lower probability BTF nesting habitat. Not unexpectedly, these model outputs are clustered throughout the central, south-western, and to a lesser extent, the south-eastern sectors of the study site. One area is located within the northeastern section of the study site (Spring Creek area).

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**Legend**

- Surveyed water sources which are known/likely to support water for at least 4 months
- Higher probability BTF nesting habitat occurs where preferred habitat is present within 400m of a permanent water resource
- Lower probability BTF nesting habitat occurs where preferred habitat is present within 400-1000m of a permanent water resource
- Study Area

5 Davina Street  
Tarragindi QLD 4121  
Ph: (07) 3892 4402  
www.austecology.com.au



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**SCALE:**

0 1.5 3 6  
Kilometres

**DATA SOURCE:**  
Source:EPA Regional Ecosystems Digital Database, Version 6.0, 2009©  
Source:Department of Mines and Energy, Digital Database, 2011©

**CLIENT:** Waratah Coal Pty Ltd.

**PROJECT:** Black-throated Finch Survey and Habitat Assessments for EPC 1040, Galilee Basin, Central Queensland.

**TITLE:**  
Figure 4.2  
Black-throated Finch Nesting Habitat – Predictive Model Outputs.

<b>DATE:</b> 09-06-11	<b>SIZE:</b> A3
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## 5. Summary and Conclusions

This report provides preliminary information on the study site's potential values for the Black-throated Finch (southern) *Poephila cincta cincta* (BTF).

The field program provided 14 survey-person days during late-wet season conditions. Field coverage of the study site was considered extensive. A total of 126 native bird species were recorded, including three finch species, though no BTF were observed.

Nest searches conducted in habitats surrounding a wide variety of water bodies across the study site provided records of 72 grassfinch nests (intact and vestigial remains). None of this evidence provided conclusive evidence of the presence of BTF.

The author is aware of a putative record of BTF from the Bimblebox Nature Refuge (May 2011) and has sought confirmation and record details. At the time of preparing this report, no further information on that record has been made available to the author.

The habitat assessment program found that:

- Much of the northern sector of the study site supports a cleared and grazed landscape, with ground cover generally dominated by the introduced Buffel Grass. These areas do not support any significant values for BTF.
- The central and south-western parts of the study site support a large area of remnant woodland. These woodland habitats are dominated by eucalypts, principally Silver-leaved Ironbark (*Eucalyptus melanophloia*) and Poplar Box (*Eucalyptus populnea*), and support a diversity of native grasses, though also introduced taxa (e.g. Buffel Grass). A comparatively small patch of woodland is also located within the south-eastern sector of the study site.
- The majority of remnant woodland on the study site conforms to a subset of regional ecosystems in which BTF has been recorded within the Desert Uplands Bioregion (see Morgan *et al.* 2002; and BTFRP 2007).
- Whilst differences are evident throughout these woodland habitats (e.g. variations in both structural and floristic characteristics), much of the remnant woodland on the study site appears to be potentially suitable for BTF.
- Furthermore, the extent and distribution of surface waters (of artificial or natural origin) does not appear to be a highly limiting influence on the extent of potentially suitable breeding and foraging habitat which the BTF could conceivably use.
- There are observable differences in the floristic and structural characteristics in ground cover throughout these woodland habitats and that this variation is likely reflect a range of potential foraging habitat values for BTF.
- The strongest level of connectivity between woodland habitats on the study site and remnant vegetation off-site is via the south-western sector of the study site. Notwithstanding that, there are other habitat linkages (and fauna movement opportunities), albeit less substantive, between the study site and the surrounding habitat matrix.

This report has also provided initial BTF habitat value modelling for the study site. This modelling work focuses on predicting the potential distribution of BTF nesting habitat. Model outputs indicate that potential breeding habitat, whilst limited in extent, is widely distributed throughout remnant woodland habitats.

A review of existing information has identified a small number of records and record sites for BTF within the south-eastern sector of the Desert Uplands Bioregion (Alice Tableland). The most relevant of these records, in regards to the study site, are those clustered in an arc extending approximately 100 to 200 kilometers north-west to due north of the study site (generally between Aramac to near Clermont).

It is apparent from the existing information review that there have been no systematic or regular surveys in regards to BTF in the Desert Uplands. As a result, the reviewed existing information should be regarded as indicative only, and does not necessarily provide an adequate basis to appreciate the extent of BTF occurrence in the region or the likelihood of occurrence of BTF on the study site.

This report has highlighted a variety of additional investigations and assessments which could advance the assessment of the study site's potential values for BTF, and the regional contextualisation of those values. It is intended that the findings of that work will be detailed in the information package which will ultimately support a response to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities and the Queensland Department of Environment and Management as part of Waratah Coal's submission of a supplementary environmental impact statement for the proposed project.

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## Appendix A Database of Surveyed Water points and Surrounds

#	Latitude	Longitude	Wetland Type	Summary Description
1	23.395757	146.41928	dam	Silver-leaved Silver-leaved Ironbark ( <i>E. melanophloia</i> ) woodland surrounds (@15m). Tree hollows in low abundance. Sparse woody understorey. Native grasses predominate. Buffel grass ( <i>P. cilliare</i> ) only abundant around waterbody edges. Bare earth edges and no overhanging woody vegetation. Finch nests recorded within 100m.
2	23.491157	146.293889	dam	Silver-leaved Ironbark woodland surrounds (@15m). Tree hollows in low abundance. Open woody shrub understorey (<4m). Native grasses predominate, with Buffel grass only abundant around waterbody edges. Bare earth edges and no overhanging woody vegetation. Diverse grassy understorey; mid-dense to dense grass cover with areas of sparse cover. Finch nests recorded within 100m.
3	23.51677	146.298251	modified natural waterbody	Constructed earth bank around approximately half of waterbody. Silver-leaved Ironbark woodland surrounds (>15m). Tree hollows common within 50-100m of dam with a number of large, old hollow-bearing <i>E. populnea</i> adjacent to dam. Woody understorey patchy (e.g. <i>Bursaria spinosa</i> ). Native grasses predominate, small areas of Buffel Grass present around waterbody edges. Bare earth edges. Trees (with hollows) and shrubs adjacent to waterbody. Diverse sparse to mid-dense grass cover beyond close vicinity of dam. Finch nests recorded within 100m.
4	23.533476	146.298111	dam	Waterbody set within a patch of mixed eucalypt (river red gum and bloodwood). Shrubs and small trees present and adjacent to water. Hollows rare. Close surrounds affected by weedy ground cover (Arsenic Bush <i>Senna septemtrionalis/obtusifolia</i> ). Heavily affected by cattle. Native grasses present, not dominant. Buffel present in open areas adjacent to waterbody. Bare earth margins. Notable flocks of Double-bar and Plum-headed finches. Beyond narrow treed surrounds, buffel grass pastures. Approximately 700m to nearest remnant vegetation patch. Finch nests recorded within 100m.
5	23.447904	146.291098	turkey nest dam	Small water point (@10m diameter) within copse of remnant regrowth adjacent to watercourse. Poor native grass cover (cf. buffel grass cover). No tree hollows present within close surrounds. Windmill present, thus water likely to be present most of the year.



#	Latitude	Longitude	Wetland Type	Summary Description
6	23.552521	146.329	flooded borrow pit	Adjacent to Jericho-Hobartville Road. Offsite, though near southern EPC boundary. Within a large area of remnant vegetation that extends north across on to EPC. Shrubby understorey present in close surrounds (including <i>Bursaria spinosa</i> , <i>Petalostigma pubescens</i> and <i>Carissa ovata</i> ). Native grasses predominate. Notable flocks of Double-bar, Zebra, and Plum-headed Finches present. Finch nests recorded within 100m.
7	23.550342	146.341531	dam	Mixed eucalypt ( <i>E. populnea</i> and <i>E. melanophloia</i> ) woodland surrounds. Buffel Grass present in open areas adjacent to waterbody. Bare earth margins, then shrubs and small trees within woodland surrounds. Dam built on waterway. Hollows common. Native grasses dominant within woodland. Offsite, though near southern EPC boundary. Within a large area of remnant vegetation that extends north across on to EPC. Finch nests recorded within 100m.
8	23.55291	146.33956	natural wetland	Mature Poplar Box woodland surrounding old flooded anabranch of waterway. Shallow natural wetland (@ 2ha) with rushes and sedges ( <i>Cyperus</i> spp.) present, though also inundated grassland in parts. Hollows common. Native grasses dominant within woodland. Notable flocks of Double-bar Finch present. Offsite, though near southern EPC boundary. Within a large area of remnant vegetation that extends north across EPC. Finch nests recorded within 100m.
9	23.553341	146.33373	waterway	Further upstream (to south) of area 8. Water present in pools along watercourse. Poplar Box grades into mature Silver-leaved Ironbark woodland. Hollows common. Native grasses are dominant and copses of shrubby understorey vegetation is present adjacent to watercourse. Notable flocks of Double-bar Finch present. Finch nests recorded within 100m.
10	23.545005	146.407319	dam	Mature Poplar Box woodland surrounds. Hollows relatively common. Shrubby understorey present in close surrounds. Native grasses predominate in woodland surrounds, though some buffel grass around cleared waterbody margins. Finch nests recorded within 100m.
11	23.537625	146.379149	dam	Mature Silver-leaved Ironbark (with Poplar Box) woodland surrounds. Hollows relatively common. Shrubby understorey in copses within close surrounds. Native grasses predominate in woodland surrounds, though some buffel grass around cleared waterbody margins. Finch nests recorded within 100m.
12	23.53037	146.351887	waterway	Water present in pools along watercourse within Silver-leaved Ironbark woodland surrounds. Hollows present. Native grasses are dominant and copses of shrubby understorey vegetation is present adjacent to watercourse. Waterway banks eroded and bed cattle pugged. Finch nests recorded within 100m.

#	Latitude	Longitude	Wetland Type	Summary Description
13	23.544238	146.511603	wetland	Large, relatively shallow wetland habitat of app. 40 hectares. Broad depression supports mainly River Red Gum ( <i>E. cameldulensis</i> ). Emergent aquatic macrophytes present though patchy coverage. Silver-leaved Ironbark woodland surrounds. Hollows present in woodland, though not common. Both Buffel Grass and native grasses throughout close woodland surrounds. Woody understorey vegetation present, though sparse and patchy. Finch nests recorded within 100m. Very large natural wetland (@140ha) approximately 1.2km to south-east (and off-site).
14	23.531728	146.539447	wetland	Relatively shallow, seasonal wetland of app. 25 hectares. Broad depression supports mainly River Red Gum, though also flooded Silver-leaved Ironbark woodland (with groundcover dominated by low sedges, e.g. <i>Fimbristylis</i> spp.) along eastern edges. Patches of emergent aquatic macrophytes (mainly sedges/rushes) and areas of inundated grasses present throughout. Silver-leaved Ironbark woodland surrounds. Hollows uncommon. Evidence of some canopy tree dieback through woodland. Both Buffel Grass and native grasses throughout close woodland surrounds. Woody understorey vegetation present, though sparse and patchy to north, west and south. Cleared Buffel Grass dominated pasture to east. Finch nests recorded within 100m.
15	23.47296	146.516081	dam	Silver-leaved Ironbark woodland surrounds (@12m). Tree hollows rare. Sparse woody understorey. Mixture of native grasses and Buffel Grass within surrounds. Bare earth edges with some isolated small trees adjacent to water. Northern extent of a larger area of remnant vegetation which exhibits evidence of comparatively poorer condition (lower tree canopy height, areas of canopy dieback, etc.).
16	23.49683	146.375625	dam	Small stock watering point within degraded Silver-leaved Ironbark woodland (near east of Jericho-Hobartville Road). Impoundment on watercourse. Buffel Grass abundant. Wide, bare earth margins to waterbody and notably degraded by heavy cattle usage.
17	23.486573	146.40851	dam	Waterbody between Jericho-Hobartville Road and main watercourse to east. Sparse tree cover (mainly <i>E. melanophloia</i> ) surrounding. Buffel Grass common throughout. Wide, bare earth margins to waterbody (heavily cattle pugged). Cattle degraded surrounds. Impoundment on old watercourse (overflow channel).

#	Latitude	Longitude	Wetland Type	Summary Description
18	23.470536	146.437406	dam	Dam adjacent to eastern side of main channel of Lagoon Creek. <i>E. cameldulensis</i> and <i>Corymbia tessellaris</i> dominate riparian areas, with scattered mature <i>E. populnea</i> within surrounds of waterbody. Buffel Grass predominates, though native grasses present. Hollows uncommon. Woody understory vegetation sparse. Bare earth waterbody margins.
19	23.415971	146.455273	modified billabong	Large, permanent billabong. Mature river red gum (and <i>E. tessellaris</i> ) surrounding waterbody, with several trees large hollow-bearing <i>E. cameldulensis</i> on water's edge. Hollows relatively common. Buffel grass pervasive. Adjacent and to west of the main channel of Lagoon Creek. The so-called "Moore's Lagoon" which apparently was the only waterbody to support water in the 2002 drought ( <i>pers. comm.</i> Reid Bauman; Monklands station) was one of the most persistent.
20	23.422102	146.45462	wetland	Overflow wetland adjacent to east side of Lagoon Creek. Shallow waterbody with sedges/rushes common along margins and with broader southern extent. Approximately 2ha. Surrounds cleared of remnant tree cover, though not stick raked. Some regrowth to about 3m.
21	23.463864	146.31771	dam	Large waterbody with diversity of habitats - deeper open water in east at dam wall, with shallower water with emergent vegetation with upstream "arms" of waterbody. Within 500m of large woodland remnant to south (Bimblebox NR). Scattered isolated trees and shrubs within close surrounds. Buffel grass pasture encompasses wetland. Finch nests present within 50m of waterbody.
22a	23.382783	146.466623	waterway	Large River Red Gum ( <i>E. cameldulensis</i> ) dominates riparian areas. Hollows (wide range of sizes) are common. This section of Lagoon Creek was dry (downstream of weir/Jericho-Hobartville Road). Open and grassy understorey comprising native grasses, though also Buffel Grass. Remnant vegetation reduced to a linear band associated with waterway. Surrounds cleared of remnant vegetation with sparse regrowth response at best. Small overflow depressions occur on either side of waterway.
22b	23.386142	146.464932	waterway	Similar to 22a, though long sections of this part of Lagoon Creek (upstream of weir/road) supported surface water.
23	23.38912	146.468647	natural billabong	Inundated anabranch of Lagoon Creek (app. 1km in length and up to @100m wide in sections). River Red Gum predominates along edges and within shallow inundated margins. Hollows (wide range of sizes) are common. Surrounds cleared of remnant vegetation with sparse regrowth response at best. Native grass cover patchy, buffel grass dominates.

#	Latitude	Longitude	Wetland Type	Summary Description
24	23.364895	146.463042	dam	Large waterbody supporting a diversity of habitats, e.g. deeper open water, shallow upstream sections with emergent vegetation (including extensive sedge/reed beds). Adjacent and to west of Lagoon Creek. Areas of bare earth margins and well vegetated margins (rushes and sedges). Immediate surrounds previously cleared. Some patches of remnant regrowth ( <i>E. camaldulensis</i> to 2m) within close surrounds, though the majority of the surrounds dominated by Buffel Grass.
25	23.366181	146.48774	dams	This site supports a small wetland (downstream of bund wall) and a much larger wetland upstream of the bund wall. The smallest (three waterbodies (two small dams (@0.03ha) is fringed by Para Grass ( <i>Urochloa mutica</i> ). The larger waterbody (@1.5ha) open water and vegetated margins (rushes, sedges, and grasses). Small copses of shrubs and small trees (predominantly <i>Acacia harpophylla</i> ) occur with close surrounds. Wider surrounds support grassland dominated by Buffel Grass. Adjacent and south of power easement.
26	23.437726	146.314376	dam	Impounded watercourse (Sandy Creek) which drains from large area of remnant vegetation upstream (app. 100m to south). Open water with bare earth margins near bund wall. River Red Gum and Silver-leaved Ironbark extending along western (upstream) section, and connecting with remnant vegetation. Hollows appear to be rare. Some aquatic vegetation (sedges and rushes) along margins of upstream areas. Buffel Grass dominates grassland to west, north, and east.
27	23.392179	146.342889	dam	Impounded upper tributary of Sandy Creek. Patchy regrowth River Red Gum around margins with sedges at one end. No hollows recorded. Isolated shrubs within close surrounds, though Buffel Grass dominates generally cleared surrounds.
28	23.355278	146.318347	dam	Dam adjacent to Spring Creek. Patchy regrowth River Red Gum around margins. No hollows recorded. Isolated shrubs within close surrounds, though Buffel Grass dominates generally cleared surrounds.
29	23.347551	146.305843	dam	Dam adjacent to Spring Creek. Isolated shrubs within close surrounds, though Buffel Grass dominates generally cleared surrounds.

#	Latitude	Longitude	Wetland Type	Summary Description
30	23.34246	146.293266	dam	Dam immediately adjacent (eastern edge) of extensive area of remnant vegetation supporting shrubby woodlands of Silver-leaved Ironbark and bloodwood, and dense stands of Lancewood ( <i>Acacia shirleyi</i> ) forest. Grass cover adjacent to dam varies between native (including <i>Triodia</i> sp.) and Buffel Grass dominants. Narrow band of shrubs on northern and southern margins and dense eucalypt regrowth within western extent. This regrowth provides connectivity with remnant vegetation adjacent and to west. Tree hollows present in Silver-leaved Ironbark woodland to west. Finch nests recorded within 100m.
31	23.332845	146.310172	dam	Large waterbody, apparently well frequented by cattle. Bare earth edges pugged and supporting only isolated small trees and shrubs. Surrounds mainly cleared with poor regrowth. Buffel Grass predominates. Waterbody located between two sandstone plateaus (with bloodwood and lancewood remnant vegetation).
32	23.318682	146.303399	dam	Small dam with highly degraded near surrounds. Copse of <i>E. thozeiana</i> adjacent to southern margins. Water edges bare and cattle pugged. Almost surrounded by sandstone rises and plateaus supporting remnant vegetation dominated variously by <i>E. thozeiana</i> , <i>C. leichhardtii</i> , and <i>A. shirleyi</i> .
33	23.472236	146.431851	natural depression	Small, shallow well vegetated marshy depression within watercourse on eastern side of Jericho-Hobartville Road. Manly inundated grassland, though some sedges/rushes fringing short sections of margins. Surrounded by grassy woodland dominated by Poplar Box. Woody understorey sparse. Hollows present.
34	23.559302	146.3296	flooded borrow pit	Adjacent to Jericho-Hobartville Road. Offsite, though near southern EPC boundary. Remnant vegetation dominated by Poplar Box woodland. Hollows present though, not common. Sparse woody understorey. Narrow bare earth margins. Native grasses predominate, though Buffel Grass present. Notable flocks of Double-bar and Plum-headed Finches present.
35	23.532207	146.52283	flooded gravel pit	Council gravel extraction site. Broad, shallow unvegetated waterbody. Broad bare earth margins. Clearing centrally located within a large grassy Silver-leaved Ironbark woodland remnant.
36	23.402857	146.393894	dam	Small dam within northern-central part of Bimblebox Nature Refuge (BBNR). Open <i>E. populnea</i> woodland surrounds. Hollow-bearing trees and stags present. Sparse shrub/small tree layer. Patchy Buffel Grass cover in around and near vicinity of waterbody, though native grasses more prevalent (and increasing native dominance) with distance from waterbody. Margins of dam are bare and cattle pugged. Cattle present nearby. Finch nests present within 100m.

#	Latitude	Longitude	Wetland Type	Summary Description
36	23.402857	146.393894	natural depression	Long, narrow depression along shallow drainage line to near east of dam at waypoint # 44. Open <i>E. melanophloia</i> / <i>E. populnea</i> woodland surrounds with sparse to mid-dense grass cover including Buffel Grass. Sparse shrub layer with <i>Carissa ovata</i> dominant. Dead Finish also present. Shrub layer better developed and more diverse to the south, away from water, where vegetation less impacted by cattle. Sparser grass and tree/shrub cover in immediate vicinity of water. Small number of large, living hollow-bearing <i>E. melanophloia</i> within 100 m of water body. A number of hollow-bearing stags nearby as well. Finch nests recorded within 100 m of water body.
37	23.417477	146.371957	water trough	Adjacent to southern side of power line easement. Silver-leaved Ironbark woodland surrounds. Canopy low; open to sparse. Patchy, sparse to open ground cover of Buffel Grass and native species. Diverse grass cover at distance to near east of trough. Sparse woody shrubby understorey including <i>Carissa ovata</i> and Dead Finish. Small number of hollow-bearing trees and stags away from trough. Supply to water trough recently disconnected. North-western part of BBNR.
38	23.43604	146.347021	dam	Combination of bund wall, turkey nest dam and larger waterbody. Wide bare earth margins, then dense Buffel Grass sward. Silver-leaved Ironbark woodland surrounds in poor condition to east, south and west (notable areas of canopy tree dieback). Silver-leaved Ironbark woodland to north of notably better condition (including presence of diverse open shrub layer with <i>Carissa ovata</i> dominant). Diverse, sparse to mid-dense grass cover to north of dam. Central-western part of BBNR.
??			water trough	Empty water trough near water tank in open <i>E. melanophloia</i> woodland in north-west corner of BBNR. Mid-dense grass cover dominated by native grass species with a sparse shrub layer dominated by <i>Carissa ovata</i> . Cropped Buffel Grass in immediate vicinity of tank only. Good number of hollow-bearing trees in vicinity of trough. Finch nests within 100 m of trough.
39	23.466247	146.376747	dam	Small waterbody in large grassy clearing, with <i>E. melanophloia</i> woodland surrounds. Water level in dam low at time of survey. Dense grassy near surrounds dominated by Buffel Grass. Evidence of tree canopy dieback within surrounding woodland (particularly to south). Diverse sparse to mid-dense shrub/small tree cover to the east. Mid-dense native grass cover at distance, to the south-east of dam. Hollow-bearing trees uncommon in woodland surrounding dam. Southern sector of BBNR. Finch nests present within 100m.



#	Latitude	Longitude	Wetland Type	Summary Description
40	23.465515	146.398353	dam	Appears to be a banded waterway resulting in a shallow waterbody. Narrow bare earth margins. Submerged macrophytes present. Small, isolated patches of sedges around margins. Large hollow-bearing Poplar Box trees in immediate vicinity and downstream of dam wall. High quality Silver-leaved Ironbark woodland within surrounds with well-developed understorey of small trees and shrubs (including <i>Carissa ovata</i> , Dead Finish and <i>Petalostigma pubescens</i> ). Diverse sparse to mid-dense grass cover with Buffel Grass dominant near dam. Native grass species dominate further away from dam. Hollow-bearing trees abundant. Finch nests present within 100m. Southern sector of BBNR.
41	23.435178	146.42999	dam	Turkey nest dam and larger adjacent waterbody. Wide bare earth margins, then dense Buffel Grass grass cover. Native grass cover dominating further away from dam. Shallow section of narrow water on west side of dam fringed with low sparse cover of native grasses and sedges. Aquatic macrophytes in low abundance in shallow water. Primarily Poplar Box woodland regrowth surrounds, with remnant <i>E. melanophloia</i> woodland to the west and north. Hollow-bearing trees generally uncommon. Mainly open to sparse woody shrub/small tree understorey, though small patches of mid-dense cover present. Finch nests present within 100m. Central-eastern sector of BBNR.
42	23.416438	146.446098	dam	Combination of larger open waterbody and small (shallow) overflow. The latter supports cover of emergent macrophytes (sedges and reeds) and grassy surrounds, whilst the larger open water body supports only submerged aquatic plants in patches within shallow margins, and then, bare earth margins. Buffel grass common around near surrounds of both waterbodies. Brigalow found growing near dam, where soil more clayey. Surrounding area supports a well-developed Poplar Box woodland tree canopy. Large canopy trees common and hollow-bearing trees and stags abundant. Mid-dense understorey, with dense patches of shrubs/small trees including <i>Dodonea</i> sp and <i>Carissa ovata</i> ). Grass cover sparse to mid-dense with Buffel Grass dominant near dam and native grasses increasing in abundance away from dam. North-eastern part of BBNR (Jericho-Hobartville Road adjacent and to east).



## Appendix B      Habitat Photographs



Water point #3 – a modified natural waterbody and adjoining grassy open woodland.  
Regarded as an area of comparatively higher quality habitat for BTF







Water point #18 -An example of a water point with woodland surrounds, though ground cover highly degraded by dominance of Buffel Grass.







Water points #26 (above) and #16 (below). Examples of sites heavily used by cattle as drinking points, and where surrounds (both grassland and woodland) support dense cover of Buffel grass.







Water point #40 – An example of a water body embedded within a wider area of high quality open woodland habitat, supporting a diverse native grass cover, shrubby understory, and abundance of hollow-bearing trees.







Water points #22a (above) and # 22b (below). Large hollow-bearing River Red Gum dominates riparian remnant vegetation which is reduced to a linear band and cleared surrounds. Buffel grass is abundant.







Water point # 20 – A large, shallow overflow area adjacent to Lagoon Creek. Cleared areas to east with sparse tree regrowth and Buffel Grass dominant. Riparian tree cover to west with Buffel Grass present, though also Guinea Grass.







Water points #13 (above; flooded River Red Gum woodland) and #14 (below; flooded Silver-leaved Ironbark woodland). Both located in the south-eastern corner of the study site.







Water points #12 (above) and #9 (below). Examples of temporary pools within seasonal watercourses in open woodland within the southern parts of the study site.







Examples of habitats subject to slow-speed driving transect surveys for BTF.







Examples of Poplar Box woodland habitat on the study site







Examples of Silver-leaved Ironbark woodland habitat on the study site.







Examples of Silver-leaved Ironbark woodland habitat on the study site.







Examples of Buffel Grass and Black Speargrass dominated open grassland (pasture) which is characteristic of the northern sector of the study site.







Low open grassy shrubland community. Restricted to two areas, being within the north-eastern part of the study site (-23.354316146.512397) and within the north-east corner of the BBNR (-23.402879146.355417).







Examples of variation in grass cover – density and height of cover







Examples of tall dense and low dense grass cover observed within remnant woodland





## Appendix C Database of Bird Survey Records

**Column 1** – Status: E = Endangered; V = Vulnerable; NT = Near Threatened (EPBCA entry capitalised; NCA entry lower case). Native species without entries in 'Status' column are listed as Least Concern under the NCA. # = introduced species.

**Column 2** – Alpha Coal Project site (AARC 2010)

**Column 3** – WorleyParsons 2009 and Unidel 2011 - Study Site Records

**Column 4** - BBNR Records (2003 - October 2010) - Study Site Records

**Column 5** - Austeclogy May 2011 - Study Site Records

Zoological Name	Common Name	1	2	3	4	5
<b>CASUARIIDAE</b>						
<i>Dromaius novaehollandiae</i>	Emu		1	1	1	1
<b>MEGAPODIIDAE</b>						
<i>Alectura lathami</i>	Australian Brush-turkey					
<b>PHASIANIDAE</b>						
<i>Coturnix pectoralis</i>	Stubble Quail					1
<i>Coturnix ypsilophora</i>	Brown Quail		1		1	1
<b>ANSERANATIDAE</b>						
<i>Anseranas semipalmata</i>	Magpie Goose					
<b>ANATIDAE</b>						
<i>Anas gracilis</i>	Grey Teal		1	1	1	1
<i>Anas superciliosa</i>	Pacific Black Duck		1	1	1	1
<i>Aythya australis</i>	Hardhead			1	1	1
<i>Chenonetta jubata</i>	Australian Wood Duck		1	1	1	1
<i>Malacorhynchus membranaceus</i>	Pink-eared Duck					1
<i>Cygnus atratus</i>	Black Swan					
<i>Dendrocygna arcuata</i>	Wandering Whistling-Duck				1	1
<i>Dendrocygna eytoni</i>	Plumed Whistling-Duck			1	1	1
<i>Nettapus coromandelianus</i>	Cotton Pygmy Goose	nt				
<i>Stictonetta naevosa</i>	Freckled Duck	nt				
<i>Anas rhynchotis</i>	Australasian Shoveler					1
<b>PODICIPEDIDAE</b>						
<i>Podiceps cristatus</i>	Great Crested Grebe			1		1
<i>Tachybaptus novaehollandiae</i>	Australasian Grebe				1	1
<i>Poliocephalus poliocephalus</i>	Hoary-headed Grebe					1
<b>ANHINGIDAE</b>						
<i>Anhinga melanogaster</i>	Darter		1	1	1	1
<b>PHALACROCORACIDAE</b>						
<i>Phalacrocorax carbo</i>	Great Cormorant			1		
<i>Phalacrocorax melanoleucos</i>	Little Pied Cormorant			1		1
<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant		1		1	1
<i>Phalacrocorax varius</i>	Pied Cormorant			1		
<b>PELECANIDE</b>						
<i>Pelecanus conspicillatus</i>	Australian Pelican		1	1		
<b>ARDEIDAE</b>						
<i>Ardea alba</i>	Great Egret		1		1	1
<i>Ardea ibis</i>	Cattle Egret					
<i>Ardea intermedia</i>	Intermediate Egret		1	1		1
<i>Ardea pacifica</i>	White-necked Heron		1	1	1	1
<i>Egretta garzetta</i>	Little Egret					

Zoological Name	Common Name	1	2	3	4	5
<i>Egretta novaehollandiae</i>	White-faced Heron		1	1	1	1
<i>Ixobrychus flavicollis</i>	Black Bittern					
<i>Nycticorax caledonicus</i>	Nankeen Night Heron		1		1	
<b>THRESKIORNITHIDAE</b>						
<i>Platalea flavipes</i>	Yellow-billed Spoonbill		1		1	1
<i>Platalea regia</i>	Royal Spoonbill					1
<i>Threskiornis molucca</i>	Australian White Ibis		1			1
<i>Threskiornis spinicollis</i>	Straw-necked Ibis		1		1	1
<b>CICONIIDAE</b>						
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	nt		1		1
<b>ACCIPITRIDAE</b>						
<i>Accipiter cirrhocephalus</i>	Collared Sparrowhawk				1	1
<i>Accipiter fasciatus</i>	Brown Goshawk			1		1
<i>Accipiter novaehollandiae</i>	Grey Goshawk	nt				
<i>Aquila audax</i>	Wedge-tailed Eagle		1	1	1	1
<i>Aviceda subcristata</i>	Pacific Baza					
<i>Circus approximans</i>	Swamp Harrier					
<i>Circus assimilis</i>	Spotted Harrier					
<i>Elanus axillaris</i>	Black-shouldered Kite		1	1	1	1
<i>Erythrotriorchis radiatus</i>	Red Goshawk	Ee				
<i>Hamirostra melanosternon</i>	Black-breasted Bustard					
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle					
<i>Haliastur sphenurus</i>	Whistling Kite		1	1	1	1
<i>Hieraaetus morphnoides</i>	Little Eagle				1	
<i>Lophoictinia isura</i>	Square-tailed Kite	nt				
<i>Milvus migrans</i>	Black Kite			1	1	1
<b>FALCONIDAE</b>						
<i>Falco berigora</i>	Brown Falcon		1	1	1	1
<i>Falco subniger</i>	Black Falcon				1	
<i>Falco cenchroides</i>	Nankeen Kestrel		1	1	1	1
<i>Falco hypoleucos</i>	Grey Falcon	nt				
<i>Falco longipennis</i>	Australian Hobby		1			1
<i>Falco peregrinus</i>	Peregrine Falcon			1		1
<i>Falco subniger</i>	Black Falcon					
<b>GRUIDAE</b>						
<i>Grus rubicunda</i>	Brolga		1	1	1	1
<b>RALLIDAE</b>						
<i>Tribonyx ventralis</i>	Black-tailed Native-hen					
<i>Amaurornis olivaceus</i>	Bush Hen					
<i>Fulica atra</i>	Eurasian Coot					1
<i>Gallinula tenebrosa</i>	Dusky Moorhen					
<i>Gallirallus philippensis</i>	Buff-banded Rail					
<i>Porphyrio porphyrio</i>	Purple Swamphen					
<i>Porzana tabuensis</i>	Spotless Crake					
<i>Lewinia pectoralis</i>	Lewin's Rail	nt				
<i>Porzana fluminea</i>	Australian Spotted Crake					
<b>OTIDIDAE</b>						
<i>Ardeotis australis</i>	Australian Bustard		1	1	1	1
<b>JACANIDAE</b>						
<i>Irediparra gallinacea</i>	Comb-crested Jacana					1
<b>ROSTRATULIDAE</b>						
<i>Rostratula australis</i>	Australian Painted Snipe	Vv				
<b>SCOLOPACIDAE</b>						
<i>Actitis hypoleucos</i>	Common Sandpiper					



Zoological Name	Common Name	1	2	3	4	5
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper					1
<i>Calidris ferruginea</i>	Curlew Sandpiper					
<i>Gallinago hardwickii</i>	Latham's Snipe					
<i>Tringa stagnatilis</i>	Marsh Sandpiper					
<b>TURNICIDAE</b>						
<i>Turnix velox</i>	Little Button-quail				1	
<b>BURHINIDAE</b>						
<i>Burhinus grallarius</i>	Bush Stone-curlew		1	1	1	1
<b>RECURVIROSTRIDAE</b>						
<i>Himantopus himantopus</i>	Black-winged Stilt					1
<b>CHARADRIIDAE</b>						
<i>Charadrius ruficapillus</i>	Red-capped Plover					
<i>Elseyornis melanops</i>	Black-fronted Dotterel		1	1	1	1
<i>Erythronyx cinctus</i>	Red-kneed Dotterel			1		
<i>Vanellus miles</i>	Masked Lapwing		1	1	1	1
<i>Vanellus tricolor</i>	Banded Lapwing		1	1		1
<b>GLAREOLIDAE</b>						
<i>Stiltia isabella</i>	Australian Pratincole					1
<b>LARIDAE</b>						
<i>Chlidonias hybridus</i>	Whiskered Tern					
<i>Chlidonias leucopterus</i>	White-winged Black Tern					
<i>Larus novaehollandiae</i>	Silver Gull					
<i>Sterna caspia</i>	Caspian Tern					
<b>COLUMBIDAE</b>						
<i>Columba livia</i>	Rock Dove	#				
<i>Geopelia cuneata</i>	Diamond Dove		1	1	1	
<i>Geopelia humeralis</i>	Bar-shouldered Dove			1	1	1
<i>Geopelia striata</i>	Peaceful Dove		1	1	1	1
<i>Geophaps scripta scripta</i>	Squatter Pigeon (sth. subsp.)	Vv	1		1	
<i>Leucosarcia melanoleuca</i>	Wonga Pigeon					
<i>Ocyphaps lophotes</i>	Crested Pigeon		1	1	1	1
<i>Phaps chalcoptera</i>	Common Bronzewing		1	1	1	1
<b>CACATUIDAE</b>						
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo		1	1	1	1
<i>Cacatua roseicapilla</i>	Galah		1	1	1	1
<i>Cacatua sanguinea</i>	Little Corella					
<i>Calyptorhynchus banksii</i>	Red-tailed Black Cockatoo		1	1	1	1
<i>Calyptorhynchus funereus</i>	Yellow-tailed Black Cockatoo				1	
<i>Calyptorhynchus lathami</i>	Glossy-black Cockatoo	v				
<i>Nymphicus hollandicus</i>	Cockatiel		1		1	
<b>PSITTACIDAE</b>						
<i>Alisterus scapularis</i>	Australian King Parrot					
<i>Aprosmictus erythropterus</i>	Red-winged Parrot		1	1	1	1
<i>Glossopsitta pusilla</i>	Little Lorikeet					
<i>Melopsittacus undulatus</i>	Budgerigar		1		1	
<i>Platycercus adscitus</i>	Pale-headed Rosella		1	1	1	1
<i>Trichoglossus chlorolepidotus</i>	Scaly-breasted Lorikeet		1			
<i>Trichoglossus haematodus</i>	Rainbow Lorikeet		1	1	1	1
<b>CUCULIDAE</b>						
<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo					
<i>Cacomantis variolosus</i>	Brush Cuckoo					
<i>Centropus phasianinus</i>	Pheasant Coucal		1	1	1	1
<i>Chrysococcyx basalis</i>	Horsfield's Bronze-Cuckoo				1	
<i>Chrysococcyx lucidus</i>	Shining Bronze-Cuckoo					

Zoological Name	Common Name	1	2	3	4	5
<i>Chrysococcyx osculans</i>	Black-eared Cuckoo				1	
<i>Cuculus pallidus</i>	Pallid Cuckoo				1	
<i>Eudynamys scolopacea</i>	Common Koel					
<i>Scythrops novaehollandiae</i>	Channel-billed Cuckoo				1	
<b>STRIGIDAE</b>						
<i>Ninox connivens</i>	Barking Owl					
<i>Ninox novaeseelandiae</i>	Southern Boobook		1	1	1	
<b>TYTONIDAE</b>						
<i>Tyto alba</i>	Eastern Barn Owl			1	1	
<i>Tyto capensis</i>	Grass Owl					
<i>Tyto novaehollandiae</i>	Masked Owl					
<b>PODARGIDAE</b>						
<i>Podargus strigoides</i>	Tawny Frogmouth		1	1	1	1
<b>EUROSTOPIIDAE</b>						
<i>Eurostopodus argus</i>	Spotted Nightjar		1			1
<i>Eurostopodus mystacalis</i>	White-throated Nightjar					
<b>CAPRIMULGIDAE</b>						
<i>Caprimulgus macrurus</i>	Large-tailed Nightjar					
<b>AEGOTHELIDAE</b>						
<i>Aegotheles cristatus</i>	Australian Owlet-nightjar				1	1
<b>APODIDAE</b>						
<i>Apus pacificus</i>	Fork-tailed Swift					
<i>Hirundapus caudacutus</i>	White-throated Needletail					
<b>ALCEDINIDAE</b>						
<i>Ceyx azureus</i>	Azure Kingfisher		1			
<b>HALCYONIDAE</b>						
<i>Dacelo leachii</i>	Blue-winged Kookaburra			1	1	1
<i>Dacelo novaeguineae</i>	Laughing Kookaburra		1	1	1	1
<i>Todiramphus macleayi</i>	Forest Kingfisher		1			
<i>Todiramphus pyrrhopygia</i>	Red-backed Kingfisher			1	1	1
<i>Todiramphus sanctus</i>	Sacred Kingfisher		1		1	1
<b>MEROPIIDAE</b>						
<i>Merops ornatus</i>	Rainbow Bee-eater		1	1	1	
<b>CORACIIDAE</b>						
<i>Eurystomus orientalis</i>	Dollarbird		1	1	1	
<b>CLIMACTERIDAE</b>						
<i>Climacteris picumnus</i>	Brown Treecreeper		1	1	1	1
<i>Corombates leucophaea metastasis</i>	White-throated Treecreeper (sth.)		1			
<b>PTILINORHYNCHIDAE</b>						
<i>Chlamydera maculata</i>	Spotted Bowerbird		1	1	1	1
<b>ACANTHIZIDAE</b>						
<i>Acanthiza apicalis</i>	Inland Thornbill			1	1	1
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill		1	1	1	1
<i>Acanthiza nana</i>	Yellow Thornbill			1	1	
<i>Acanthiza pusilla</i>	Brown Thornbill					
<i>Acanthiza reguloides</i>	Buff-rumped Thornbill			1	1	1
<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill				1	
<i>Chthonicola sagittata</i>	Speckled Warbler				1	1
<i>Gerygone olivacea</i>	Western Gerygone			1	1	1
<i>Gerygone fusca</i>	White-throated Gerygone			1	1	1
<i>Gerygone palpebrosa</i>	Fairy Gerygone					
<i>Sericornis frontalis</i>	White-browed Scrubwren					
<i>Smicrornis brevirostris</i>	Weebill		1	1	1	1

Zoological Name	Common Name	1	2	3	4	5
<b>PARDALOTIDAE</b>						
<i>Pardalotus striatus</i>	Striated Pardalote		1	1	1	1
<i>Pardalotus punctatus</i>	Spotted Pardalote					
<i>Pardalotus rubricatus</i>	Red-browed Pardalote					
<b>MALURIDAE</b>						
<i>Malurus cyaneus</i>	Superb Fairy-wren		1			
<i>Malurus lamberti</i>	Variegated Fairy-wren		1	1	1	1
<i>Malurus melanocephalus</i>	Red-backed Fairy-wren		1	1	1	1
<b>MELIPHAGIDAE</b>						
<i>Acanthorhynchus tenuirostris</i>	Eastern Spinebill					
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater			1	1	1
<i>Entomyzon cyanotis</i>	Blue-faced Honeyeater		1	1	1	1
<i>Lichenostomus chrysops</i>	Yellow-faced Honeyeater					
<i>Lichenostomus flavus</i>	Yellow Honeyeater					
<i>Lichenostomus fuscus</i>	Fuscous Honeyeater				1	
<i>Lichenostomus keartlandi</i>	Grey-headed Honeyeater			1		
<i>Lichenostomus leucotis</i>	White-eared Honeyeater					1
<i>Lichenostomus melanops</i>	Yellow-tufted Honeyeater					
<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater		1	1	1	1
<i>Lichenostomus plumulus</i>	Grey-fronted Honeyeater				1	1
<i>Lichenostomus virescens</i>	Singing Honeyeater		1	1	1	1
<i>Lichmera indistincta</i>	Brown Honeyeater				1	1
<i>Manorina flavigula</i>	Yellow-throated Miner			1	1	1
<i>Manorina melanocephala</i>	Noisy Miner		1	1		
<i>Meliphaga lewinii</i>	Lewin's Honeyeater					
<i>Melithreptus albogularis</i>	White-throated Honeyeater		1			
<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater					
<i>Melithreptus lunatus</i>	White-naped Honeyeater					
<i>Melithreptus gularis</i>	Black-chinned Honeyeater	nt			1	
<i>Myzomela sanguinolenta</i>	Scarlet Honeyeater					
<i>Philemon citreogularis</i>	Little Friarbird			1	1	1
<i>Philemon corniculatus</i>	Noisy Friarbird		1	1	1	1
<i>Phylidonyris nigra</i>	White-cheeked Honeyeater					
<i>Plectorhyncha lanceolata</i>	Striped Honeyeater			1	1	1
<b>POMATOSTOMIDAE</b>						
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler		1	1	1	1
<b>PSOPHODIDAE</b>						
<i>Cinclosoma punctatum</i>	Spotted Quail-thrush					
<i>Psophodes olivaceus</i>	Eastern Whipbird					
<b>NEOSITTIDAE</b>						
<i>Daphoenositta chrysoptera</i>	Varied Sittella		1	1	1	1
<b>CAMPEPHAGIDAE</b>						
<i>Coracina maxima</i>	Ground Cuckoo-shrike				1	1
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike		1	1	1	1
<i>Coracina papuensis</i>	White-bellied Cuckoo-shrike				1	
<i>Coracina tenuirostris</i>	Cicadabird					
<i>Lalage leucomela</i>	Varied Triller					
<i>Lalage sueurii</i>	White-winged Triller		1	1	1	1
<i>Oreocia gutturalis</i>	Crested Bellbird			1	1	1
<b>PACHYCEPHALIDAE</b>						
<i>Colluricincla harmonica</i>	Grey Shrike-thrush			1	1	1
<i>Colluricincla megarhyncha</i>	Little Shrike-thrush					
<i>Pachycephala pectoralis</i>	Golden Whistler		1		1	
<i>Pachycephala rufiventris</i>	Rufous Whistler		1	1	1	1

Zoological Name	Common Name	1	2	3	4	5
<b>ORIOLIDAE</b>						
<i>Oriolus sagittatus</i>	Olive-backed Oriole				1	1
<i>Sphecotheres viridis</i>	Figbird				1	
<b>ARTAMIDAE</b>						
<i>Artamus cinereus</i>	Black-faced Woodswallow		1	1	1	1
<i>Artamus cyanopterus</i>	Dusky Woodswallow		1	1	1	1
<i>Artamus leucorhynchus</i>	White-breasted Woodswallow		1			1
<i>Artamus minor</i>	Little Woodswallow			1	1	
<i>Artamus personatus</i>	Masked Woodswallow			1	1	1
<i>Artamus superciliosus</i>	White-browed Woodswallow			1	1	1
<i>Cracticus nigrogularis</i>	Pied Butcherbird		1	1	1	1
<i>Cracticus torquatus</i>	Grey Butcherbird		1	1	1	1
<i>Gymnorhina tibicen</i>	Australian Magpie		1	1	1	1
<i>Strepera graculina</i>	Pied Currawong			1	1	1
<b>DICRURIDAE</b>						
<i>Dicrurus bracteatus</i>	Spangled Drongo				1	
<b>RHIPIDURIDAE</b>						
<i>Rhipidura fuliginosa</i>	Grey Fantail		1	1	1	1
<i>Rhipidura leucophrys</i>	Willie Wagtail		1	1	1	1
<i>Rhipidura rufifrons</i>	Rufous Fantail					
<b>CORVIDAE</b>						
<i>Corvus coronoides</i>	Australian Raven		1	1	1	1
<i>Corvus orru</i>	Torresian Crow		1	1	1	1
<b>MONARCHIDAE</b>						
<i>Grallina cyanoleuca</i>	Magpie-lark		1	1	1	1
<i>Monarcha leucotis</i>	White-eared Monarch					
<i>Monarcha melanopsis</i>	Black-faced Monarch					
<i>Monarcha trivirgatus</i>	Spectacled Monarch					
<i>Myiagra alecto</i>	Shining Flycatcher					
<i>Myiagra cyanoleuca</i>	Satin Flycatcher					
<i>Myiagra inquieta</i>	Restless Flycatcher			1	1	1
<i>Myiagra rubecula</i>	Leaden Flycatcher		1		1	
<b>CORORACIDAE</b>						
<i>Corcorax melanorhamphos</i>	White-winged Chough		1			1
<i>Struthidea cinerea</i>	Apostlebird		1	1	1	1
<b>PETROICIDAE</b>						
<i>Eopsaltria australis</i>	Eastern Yellow Robin					
<i>Microeca fascians</i>	Jacky Winter		1	1	1	1
<i>Petroica rosea</i>	Rose Robin					
<i>Petroica goodenovii</i>	Red-capped Robin		1		1	1
<i>Melanodryas cullata</i>	Hooded Robin		1	1	1	1
<b>ALAUDIDAE</b>						
<i>Mirafra javanica</i>	Singing Bushlark					1
<b>CISTICOLIDAE</b>						
<i>Cisticola exilis</i>	Golden-headed Cisticola					1
<b>ACROCEPHALIDAE</b>						
<i>Acrocephalus stentoreus</i>	Australian Reed-Warbler					
<b>MEGALURIDAE</b>						
<i>Cincloramphus cruralis</i>	Brown Songlark			1	1	
<i>Cincloramphus mathewsi</i>	Rufous Songlark			1	1	1
<i>Megalurus gramineus</i>	Little Grassbird					
<i>Megalurus timoriensis</i>	Tawny Grassbird					
<b>TIMALIIDAE</b>						
<i>Zosterops lateralis</i>	Silveryeye					

Zoological Name	Common Name	1	2	3	4	5
<b>HIRUNDINIDAE</b>						
<i>Cheramoeca leucosternus</i>	White-backed Swallow					
<i>Hirundo ariel</i>	Fairy Martin			1		1
<i>Hirundo neoxena</i>	Welcome Swallow					
<i>Hirundo nigricans</i>	Tree Martin		1		1	1
<b>NECTARINIIDAE</b>						
<i>Dicaeum hirundinaceum</i>	Mistletoebird			1	1	1
<i>Nectarina jugularis</i>	Olive-backed Sunbird					
<b>ESTRILDIDAE</b>						
<i>Lonchura castaneothorax</i>	Chestnut-breasted Mannikin					
<i>Lonchura punctulata</i>	Nutmeg Mannikin					
<i>Neochmia modesta</i>	Plum-headed Finch		1		1	1
<i>Taeniopygia bichenovii</i>	Double-barred Finch		1	1	1	1
<i>Taeniopygia guttata</i>	Zebra Finch		1	1	1	1
<b>PASSERIDAE</b>						
<i>Passer domesticus</i>	House Sparrow	#				
<b>MOTACILLIDAE</b>						
<i>Anthus novaeseelandiae</i>	Australasian Pipit		1	1	1	1
<b>Total Number of Species</b>			<b>94</b>	<b>104</b>	<b>128</b>	<b>126</b>