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# Distribution of Black-breasted Button-quail in the Fitzroy Basin, and extent and condition of remnant dry rainforest habitat

Report to the Fitzroy Basin Association

Wayne Houston, Robert Black and Leif Black

Terrestrial Ecology Programme

Centre for Environmental Management

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**December 2011**



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MANAGEMENT



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## Abstract

Black-breasted Button-quail (*Turnix melanogaster*) is listed as *vulnerable* under the Regulations of the Queensland Government Nature Conservation Act 1992 and the Federal Government Environment Protection and Biodiversity Conservation Act 1999. Historically, Black-breasted Button Quails occupied a range from Marlborough in the north, south to northern NSW and about 300 km inland including the Dawson and Fitzroy valleys in central Queensland. Its inland distribution broadly corresponds to the western extent of drier rainforests in eastern Australia, where these habitats typically occur as small isolated patches surrounded by extensive eucalypt woodlands. Known habitat includes microphyll vine forest, notophyll vine forest, semi-evergreen vine thicket, littoral vine forest, Brigalow vine scrub or Brigalow-Belah closed forest, as well as regrowth Acacia thickets associated with beach ridges. Important attributes of Black-breasted Button-quail habitat are a closed canopy and a dense cover of leaf litter, both characteristic of rainforest associations with a pronounced seasonal dry period such as dry rainforests. Much Black-breasted Button-quail habitat in the Brigalow Belt has been substantially reduced by clearing of Bottletree scrubs and other closed canopy Brigalow associations. However, recent surveys indicate that they may still be relatively widespread in the region. Eight new sites were found in the Fitzroy Basin and adjoining south-east Queensland regions between 2004 and 2009. Thus there is a need to identify valuable remnants so that protection and management can be improved. Black-breasted Button-quail is a cryptic species and identification of their presence relies mainly on the presence of platelets; small depressions formed in the leaf litter when feeding.

This project mapped remnant vegetation types that had closed canopy vegetation in the Fitzroy Basin, surveyed some suitable remnants for signs of occupancy, developed methods to describe the microhabitat attributes of occupied sites (vegetation structure of the canopy, ground cover and leaf litter) and evaluated patch characteristics (size, vegetation type) of known Black-breasted Button-quail sites with remnant vegetation. The main findings of the project were: (i) Platelets are not a reliable method for determining the presence of Black-breasted Button-quail in well above average rainfall years. Thus, to optimise identification of new sites, it is recommended that surveys for this species be carried out during drier climatic phases. (ii) Long term population trend monitoring may also be skewed by differences in detectability. For monitoring programmes, it is recommended that most emphasis should be placed on the results of the population estimates from before and after the wetter climatic phase. In central Queensland, La Niña years tend to be a relatively short sequence in comparison to the below average rainfall El Niño phases. (iii) Overall, the presence of a relatively dense canopy, sparse groundstorey vegetation and dense leaf litter cover conforms to the general model of preferred Black-breasted Button-quail habitat. An additional component may be the dominance of relatively smaller leaves in the leaf litter (microphyll size). (iv) Black-breasted Button-quail habitat is typified by large intact patches of predominantly dry rainforest with good connectivity. (v) A number of sites with the potential to provide high quality habitat for Black-breasted Button-quails have been identified and a method to identify potential sites developed. High quality habitat includes: a large area, preferably at least 100 ha but 50 ha is acceptable (but can be a series of lenses within open woodland), preferably connected to other forest area; a reasonably continuous canopy (>70%) and a well shaded understorey; SEVT of some sort, particularly Bottle Tree scrub and RE 11.11.5; a ground layer dominated by open areas with thick litter but some patches of dense shrub; and a dominance in the canopy of small-leaved litter providers.



Male (above) and female (below) – photographs © Graeme Chapman

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## 1. Introduction

Black-breasted Button-quail (*Turnix melanogaster*) is listed as *vulnerable* under the Regulations of the Queensland Government Nature Conservation Act 1992 and the Federal Government Environment Protection and Biodiversity Conservation Act 1999. Reasons for listing are that the area occupied by this species is less than 2000 km<sup>2</sup> and fragmented (Garnett and Crowley 2000).

Historically, Black-breasted Button Quails occupied a range from Marlborough in the north, south to northern NSW and approximately 300 km inland including the Dawson and Fitzroy valleys in central Queensland (Bennett 1985; Marchant and Higgins 1993; Hamley *et al.* 1997; Garnett *et al.* 2011); corresponding to the South-east Queensland and Brigalow Belt Bioregions (Sattler and Williams 1999). Its inland distribution broadly corresponds to the western extent of drier rainforests in eastern Australia, where these habitats typically occur as small isolated patches surrounded by extensive eucalypt woodlands. Dry rainforests are a type of rainforest that occurs in relatively low rainfall and highly seasonal environments (500-1500 mm), differing from woodlands in having a relatively dense canopy cover, presence of vines and a diverse array of plant species (Webb and Tracey 1981; Fensham 1995; Hansman 2001).

Its current distribution, based on surveys of potential habitat in central and south-east Queensland, indicated a stronghold in south-east Queensland north to Bundaberg, west to the Bunya Mountains and south to the NSW border (Hamley *et al.* 1997). Sightings from several populations in the Brigalow Belt including Marlborough north of Rockhampton, west in the headwaters of the Dawson River, Kalpower near Monto, Auburn River near Gayndah and south to near Goomeri were also reported (Hamley *et al.* 1997). Hamley *et al.* (1997) suggested that in central Queensland in the Brigalow Belt, potential Black-breasted Button-quail habitat had been substantially reduced by clearing of Bottletree scrubs and other closed canopy Brigalow associations. However, recent surveys indicate that they may still be relatively widespread in the region. Eight new sites were found in the Fitzroy Basin and adjoining south-east Queensland regions between 2004 and 2009 (Expedition Range to east of Rolleston, Belgamba, Capricorn Resort Lookout, Bulburrin, Dan Dan, Prior Park and Hummock Island, Robert Black and Lorelle Campbell; Capricorn Resort Scrub, Roger Jaensch). Another possible site (platelets present but not confirmed as Black-breasted Button Quail) was found at Herbert Ck (John McCabe, pers. comm.).

A habitat preference of Black-breasted Button-quail for closed canopy forests with sparse groundstorey vegetation has been reported (Bennett 1985; Hamley *et al.* 1997; Smith *et al.* 1998; Mathieson and Smith 2007) and these forests are described as microphyll vine forest, notophyll vine forest, semi-evergreen vine thicket, littoral vine forest, Brigalow vine scrub or Brigalow-Belah closed forest. Other important attributes of Black-breasted Button-quail habitat are a dense cover of leaf litter, a characteristic of rainforest associations with a pronounced seasonal dry period such as dry rainforests (Bennett 1985; McConnell and Hobson 1995; Mathieson and Smith 2007; Garnett *et al.* 2011), and possibly fertile soils (Smith *et al.* 1998). Although Black-breasted Button-quail have been recorded from habitat other than closed forest (e.g. Hoop Pine plantations and denser eucalypt forests with a well developed understorey – McConnell and Hobson 1995, Smith *et al.* 1998), these vegetation types were connected to vine thicket habitat or had small lenses of dry rainforest pockets embedded within them. Birds have been observed in lantana thickets but these were patches within a closed canopy vine forest or closely connected (McConnell and Hobson 1995, Smith *et al.* 1998).



The objectives of this study were to:

1. Identify possible Black-breasted Button-quail habitat in the Fitzroy Basin using vegetation mapping.
2. Locate Black-breasted Button-quail populations in significant habitat remnants.
3. Identify remnants of high habitat value for conservation.
4. Identify habitat remnants with potential for expansion by protection/regeneration to increase viable habitat.

Due to the scale of the area, it was decided to limit the study at this stage to areas in the lower Fitzroy and coastal catchments in the Rockhampton/Gladstone vicinity.

## **2. Methods**

### **2.1 Mapping**

Historical records for the Fitzroy Basin from government (Michael Mathieson) and local birdwatchers were compiled (Fig. 1), and matched to Regional Ecosystem (RE) types based on the pre-European 2006 mapping. These mostly conformed to the dry rainforest vegetation types previously identified as the main habitat of the Black-breasted Button-quail (Bennett 1985; Mathieson and Smith 2007). Of the 25 historical records, 22 were from dry rainforest dominant vegetation types, two were from Brigalow scrubs with patches of dry rainforest species and only one was from a non-dry rainforest vegetation type. These RE types along with other REs with a dry rainforest component were then compiled into a master list (Table 1) which was provided to the FBA. Peter Smith of FBA used this list to map these RE types in the Fitzroy Basin using four categories (identified REs comprising more than 70% of the polygon, 35-70%, a secondary RE of 30-50% or a tertiary of 30%), and the historical records overlaid (Smith 2010).

### **2.2 Surveys**

Surveys of known and possible sites were undertaken between December 2010 and 2011. Where possible, the patches of suitable habitat were completely searched. However, for larger patches, a minimum of 10 ha (1 km by 100 m wide) was searched by two people walking approximately 100 m apart. Because Black-breasted Button-quail is a cryptic species and relatively difficult to observe without disturbing them, identification of their presence relied mainly on the presence of platelets; although both calls and sightings were also used. Platelet dimensions are typically 150-200 mm diameter, penetrating to the bottom of the litter layer, but generally not far into the topsoil and may be up to 35 mm deep (Bennett 1985, Marchant and Higgins 1993, McConnell and Hobson 1995). Freshly formed platelets have distinctive J-shaped droppings in their centre which distinguishes them from platelets of the Painted Button-quail (Fig. 2, McConnell and Hobson 1995).

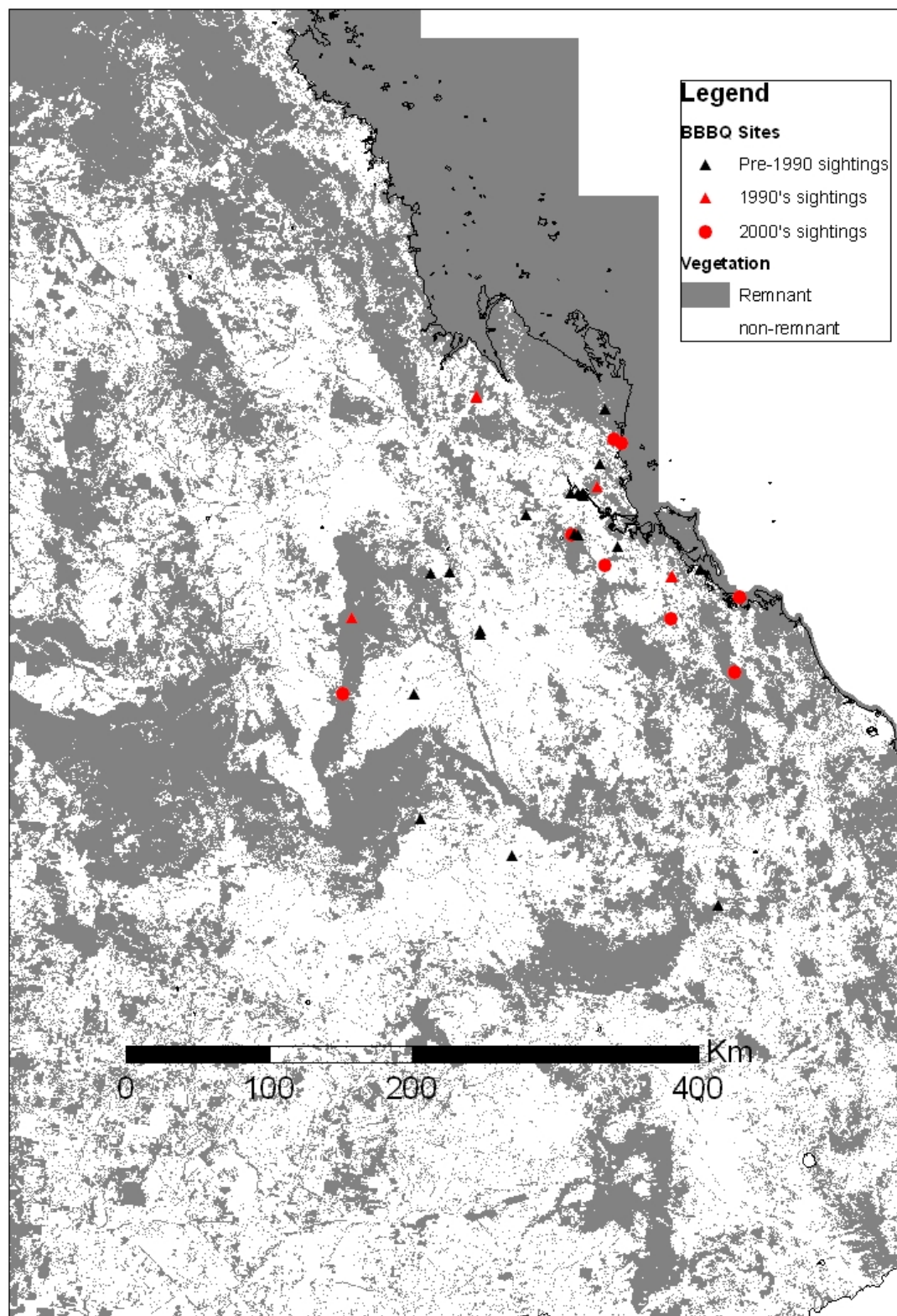


Figure 1: Location of historical and current Black-breasted Button-quail sightings in the central Queensland region

**Table 1: Master list of Regional Ecosystems with a dry rainforest component in the Fitzroy River basin including those at which Black-breasted Button-quail (BBBQ) have been recorded (derived from the pre-European Queensland Government Regional ecosystem mapping matched with both current and historical records of Black-breasted Button-quail occurrence)**

RE	BBBQ site?	No. of sites	Regional Ecosystem Description
8.2.2	yes	1	Microphyll vine forest (beach scrub) on coastal dunes. Characteristic species include <i>Mimusops elengi</i> , <i>Ganophyllum falcatum</i> , <i>Diospyros geminata</i> , <i>D. compacta</i> , <i>Pouteria sericea</i> , <i>Pleiogynium timorense</i> , <i>Drypetes deplanchei</i> , <i>Eugenia reinwardtiana</i> , <i>Cupaniopsis anacardioides</i> .
8.2.6			<i>Corymbia tessellaris</i> +/- <i>Acacia leptocarpa</i> +/- <i>Banksia integrifolia</i> +/- <i>Melaleuca dealbata</i> +/- beach scrub species open-forest on coastal parallel dunes
8.3.1	yes	1	Semi-deciduous notophyll/mesophyll vine forest fringing watercourses on alluvial plains
8.11.2			Notophyll microphyll vine forest +/- <i>Araucaria cunninghamii</i> . Characteristic species include <i>Argyrodendron polyandrum</i> , <i>Paraserianthes toona</i> , <i>Cryptocarya triplinervis</i> , <i>C. bidwillii</i> , <i>Drypetes deplanchei</i> , <i>Atalaya rigida</i> , <i>Diospyros geminata</i> , <i>Mallotus philippensis</i> , <i>Memecylon pauciflorum</i> , <i>Mischocarpus anodontus</i> , <i>Alectryon tomentosus</i> and <i>Chionanthus ramiflora</i> . <i>Araucaria cunninghamii</i> present in places. Occurs on low ranges on Permian sediments +/- volcanics.
8.12.16			Low microphyll vine forest to semi-evergreen vine thicket.. Characteristic species include <i>Gossia bidwillii</i> , <i>Psydrax odorata</i> , <i>Drypetes deplanchei</i> , <i>Bridelia leichhardtii</i> , <i>Pleiogynium timorense</i> , <i>Brachychiton australis</i> , <i>Capparis arborea</i> , <i>Diospyros geminata</i> , <i>Alectryon connatus</i> , <i>Notelaea microcarpa</i> , <i>Strychnos psilosperma</i> , <i>Paraserianthes toona</i> , <i>Flindersia australis</i> and <i>Gyrocarpus americanus</i> . Occurs on drier sub coastal hills on Mesozoic to Proterozoic igneous rocks.
11.2.3			Microphyll/notophyll vineforest to semi-deciduous vine thicket on Quaternary coastal dunes. Commonly consists of several of the following trees: <i>Pleiogynium timorense</i> , <i>Mimusops elengi</i> , <i>Cupaniopsis anacardioides</i> , <i>Exocarpos latifolius</i> , <i>Pouteria sericea</i> and <i>Diospyros geminata</i> . In dry, exposed and windswept locations, this RE may only reach 4-5 m, and include deciduous emergent species such as <i>Gyrocarpus americanus</i> and <i>Brachychiton australis</i>
11.3.11	yes	2	Semi-evergreen vine thicket or semi-deciduous notophyll rainforest on alluvial plains, frequently with emergent <i>Eucalyptus tereticornis</i> or <i>E. raveretiana</i> . Common species include <i>Diospyros humilis</i> , <i>D. geminata</i> , <i>Brachychiton australis</i> , <i>B. rupestris</i> , <i>Geijera salicifolia</i> , <i>Lysiphyllum</i> spp., <i>Mallotus philippensis</i> and <i>Streblus brunonianus</i> . Occasional shrubs such as <i>Carissa ovata</i> may be present. Forbs such as <i>Nyssanthes</i> spp. may also be present. Occurs on Cainozoic alluvial plains.
11.4.1	yes	2	Semi-evergreen vine thicket +/- <i>Casuarina cristata</i> . May commonly include <i>Pouteria cotinifolia</i> , <i>Lysiphyllum hookeri</i> , <i>Capparis</i> spp. and <i>Terminalia oblongata</i> , with lower stratum of <i>Elaeodendron australe</i> , <i>Denhamia oleaster</i> and <i>Pittosporum spinescens</i> . A groundlayer of <i>Ancistrachne uncinulata</i> , <i>Cheilanthes</i> spp., and <i>Solanum ellipticum</i> may be present. Occurs on Cainozoic clay plains including extensively weathered Tertiary basalt.
11.5.15			Semi-evergreen vine thicket. The following species are commonly present in the tree layer: <i>Flindersia australis</i> , <i>Flindersia collina</i> , <i>Alstonia constricta</i> , <i>Excoecaria dallachyana</i> , <i>Geijera parviflora</i> , <i>Notelaea</i> spp., <i>Pouteria cotinifolia</i> var. <i>pubescens</i> , <i>Diospyros humilis</i> and <i>Denhamia oleaster</i> , with emergent <i>Brachychiton rupestris</i> or <i>Flindersia australis</i> . A dense shrub layer of <i>Psydrax odorata</i> and <i>Acalypha eremorum</i> is often present. May contain emergent <i>Eucalyptus decorticans</i> or <i>Eucalyptus melanoleuca</i> in some southern locations. Occurs on remnant Tertiary surfaces. Deep red and yellow earths.
11.5.16a			<i>Acacia harpophylla</i> open forest with softwood scrub species. Occurs on sandy loam outwash (apron / piedmont slope) from sandstone ranges, on Wheetalaba.
11.8.3			Semi-evergreen vine thicket which may have emergent <i>Acacia harpophylla</i> , <i>Casuarina cristata</i> and <i>Eucalyptus</i> spp. Occurs on Cainozoic igneous rocks. Generally restricted to steeper, rocky hillsides.
11.8.13			Semi-evergreen vine thicket and microphyll/notophyll rainforest. In drier or rockier habitats, <i>Casuarina cristata</i> or <i>Acacia harpophylla</i> may dominate the tree layer. A dense shrublayer of <i>Acalypha eremorum</i> , <i>Diospyros humilis</i> and <i>Pouteria cotinifolia</i> is always present. In a few localities, emergent <i>Eucalyptus orgadophila</i> or <i>Corymbia erythrophloia</i> may persist after invasion by "vine-thicket" species. Occurs on gently undulating plains, rises and low hills on Cainozoic igneous rocks.
11.9.4			Semi-evergreen vine thicket or <i>Acacia harpophylla</i> with a semi-evergreen vine thicket understorey. Occurs on crests, mid-slopes, undulating plains and rises formed from fine-grained sediments.
11.9.5	yes	2	Open-forest dominated by <i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> . Open-forest dominated by <i>C. cristata</i> is more common in southern parts of the bioregion. A prominent low tree or tall shrub layer dominated by species such as <i>Geijera parviflora</i> and <i>Eremophila mitchellii</i> , and often with semi-evergreen vine thicket species is often present. The latter include <i>Flindersia dissosperma</i> , <i>Brachychiton rupestris</i> , <i>Excoecaria dallachyana</i> , <i>Macropteranthes leichhardtii</i> and <i>Acalypha eremorum</i> in eastern areas, and species such as <i>Carissa ovata</i> , <i>Owenia acidula</i> , <i>Croton insularis</i> , <i>Denhamia oleaster</i> and <i>Notelaea microcarpa</i> in south-western areas. <i>Melaleuca bracteata</i> may be present along watercourses.  Occurs on Cainozoic to Proterozoic consolidated, fine-grained sediments. The topography includes gently undulating plains, valley floors and undulating foot slopes and rarely on low hills. The soils are generally deep texture-contrast and cracking clays. The cracking clays are usually black or grey to brown or reddish-brown in colour, often self mulching and sometimes gilgaied in flatter areas. Some texture contrast soils are shallow to only moderately deep.

RE	BBBQ site?	No. of sites	Regional Ecosystem Description
11.9.8	yes	2	<i>Macropteranthes leichhardtii</i> thicket on Cainozoic to Proterozoic consolidated, fine-grained sediments. Lowlands.
11.10.8			Semi-evergreen vine thicket and microphyll rainforest. Occurs on medium to coarse-grained sediments that may be subject to local enrichment from adjacent rocks such as basalt as well as seepage.
11.11.4b	yes	1	<i>Corymbia trachyphloia</i> or <i>Eucalyptus acmenoides</i> , <i>E. crebra</i> woodland +/- <i>Acacia leiocalyx</i>
11.11.5	yes	7	<p>Microphyll rainforest (with or without <i>Araucaria cunninghamii</i> emergents) and semi-evergreen vine thicket. Floristics and structure varies with site. There is usually a continuous tree canopy (9 - 15m high) with a wide range of species including <i>Flindersia australis</i>, <i>Backhousia sciadophora</i>, <i>Excoecaria dallachyana</i>, <i>Melia azederach</i>, <i>Ficus</i> spp., <i>Strychnos arborea</i>, <i>Macropteranthes leichhardtii</i> and <i>Alstonia constricta</i>. An emergent tree layer (12- 20m high) commonly occurs with species including <i>Brachychiton australis</i>, <i>B. rupestris</i>, <i>Flindersia australis</i>, <i>Ficus</i> spp. <i>Araucaria cunninghamii</i> and sometimes <i>Eucalyptus</i> spp. There is a shrub layer (1-3m high) with density depending on canopy cover and frequent species including <i>Croton</i> spp., <i>Abutilon</i> spp., <i>Capparis</i> spp., <i>Acalypha eremorum</i> and <i>Codonocarpus attenuatus</i>. Ferns, mosses and vines are common.</p> <p>Occurs on hilly terrain with slopes ranging from 55 and up to 80% locally. Formed from Mesozoic to Proterozoic moderately to strongly deformed and metamorphosed sediments and interbedded volcanics. Associated soils are generally shallow loams and clays with minor areas of deeper cover. Major vegetation communities include;</p> <p>11.11.5a; Vine thicket, usually with no <i>Araucaria cunninghamii</i> emergents.</p>
11.11.18	yes	1	Semi-evergreen vine thicket. Occurs on undulating plains, rises and gentle slopes of ranges formed on moderately to strongly deformed and metamorphosed sediments and interbedded volcanics.
11.11.21			Semi-evergreen vine thicket on serpentinite. Species include <i>Brachychiton rupestris</i> , <i>Gossia bidwillii</i> , <i>Notelaea longifolia</i> , <i>Cupaniopsis wadsworthii</i> , <i>Diospyros</i> spp., <i>Croton insularis</i> , <i>Alyxia ruscifolia</i> , <i>Turraea pubescens</i> , <i>Quassia bidwillii</i> and includes the endemic <i>Neoroepora buxifolia</i> . Occurs on narrow hillcrests, upper slopes, gullies, foot slopes and laterised hills with shallow to moderately deep stony red to brown clay loams and clays formed from moderately weathered or laterised serpentinite hills and mountains.
11.12.4	yes	2	<p>Semi-evergreen vine thicket and microphyll vine forest ± <i>Araucaria cunninghamii</i>. <i>Eucalyptus moluccana</i> often associated with lower slopes on andesites. Occurs on low hills, ranges and boulder strewn slopes formed from Mesozoic to Proterozoic igneous rocks including granite. Major vegetation communities include;</p> <p>11.12.4a; Semi-evergreen vine thicket with open patches of <i>Acacia fasciculifera</i>, <i>Archidendropsis thozetiana</i>, <i>Pleiogynium timorense</i> and various other species.</p>
11.12.21			Open-forest dominated by <i>Acacia harpophylla</i> with or without semi-evergreen vine thicket species. A moderately tall dense shrub layer of <i>Geijera parviflora</i> and <i>Eremophila mitchellii</i> may occur where semi-evergreen vine thicket species are absent. Lower shrubs of <i>Carissa ovata</i> , <i>Alectryon</i> sp. and <i>Capparis</i> spp. may also be present. Occurs on Mesozoic to Proterozoic igneous rocks on colluvial lower slopes of volcanic hills and strongly undulating plains. Soils range from moderately deep cracking clays to clay loams and deep texture contrast soils.
12.11.4	yes	1	<p>Semi-evergreen vine thicket and microphyll vine forest ± <i>Araucaria cunninghamii</i>. <i>Eucalyptus moluccana</i> often associated with lower slopes on andesites. Occurs on low hills, ranges and boulder strewn slopes formed from Mesozoic to Proterozoic igneous rocks including granite. Major vegetation communities include;</p> <p>11.12.4a; Semi-evergreen vine thicket with open patches of <i>Acacia fasciculifera</i>, <i>Archidendropsis thozetiana</i>, <i>Pleiogynium timorense</i> and various other species.</p>
12.12.16	yes	1	Notophyll vine forest on Mesozoic to Proterozoic igneous rocks. Characteristic species include <i>Araucaria bidwillii</i> , <i>A. cunninghamii</i> , <i>Argyrodendron trifoliolatum</i> , <i>Argyrodendron</i> sp. (Kin Kin W.D. Francis AQ 81198), <i>Choricarpia subargentea</i> , <i>Brachychiton discolor</i> , <i>Beilschmiedia obtusifolia</i> , <i>Diospyros pentamera</i> , <i>Grevillea robusta</i> , <i>Gmelina leichhardtii</i> , <i>Ficus macrophylla</i> and <i>Sloanea woollsii</i> . <i>Eucalyptus</i> spp. especially <i>E. siderophloia</i> , <i>E. propinqua</i> and <i>E. grandis</i> may be present as emergents.





Figure 2: Two views of platelets (a, b) and a close-up of the distinctively shaped pellets usually found in the platelets (c). Black-breasted Button-quail pellets are typically strongly hooked (as in c) rather than gently curved as in the Painted Button-quail (as in d) (McConnell and Hobson 1995).

## 2.3 Microhabitat assessment

To further understanding of what constitutes “good” Black-breasted Button-quail habitat, attributes of sites where Black-breasted Button-quail were known to occur were quantified. This will provide a basis for evaluating which habitat attributes differ between Black-breasted Button-quail occupied sites and non-occupied sites.

A habitat assessment protocol was developed. Data were collected from three points along a transect at each site, each point about 50 m apart to provide information on:

- general site features (aspect, slope, soil type, disturbance)
- stand attributes (basal area, canopy cover, tree density),
- understorey attributes (shrub species richness, shrub density, density or cover of woody weeds)
- groundcover attributes (percentage cover of grass, herbs, low shrubs, herbaceous weeds, litter and its components; litter volume).

Preliminary surveys were undertaken at Belgamba and Mt Archer northwest in December 2010. Subsequently, full surveys using the habitat assessment proforma at Belgamba (one site), Capricorn Resort (two sites) and an analogue site just to the north of the resort (Fishing Ck - beach scrub south of Corio Bay) were undertaken in February 2011.

The relationship between leaf size of the leaves in the litter that Black-breasted Button-quail forage in and their presence was also evaluated. Litter samples from a 0.5 by 0.5 m quadrat were collected at each of the three points and sorted into four size ranges (nano, micro, noto, meso) used for classifying rainforests (Webb and Tracey 1981; Webb *et al.* 1984). These data will be used to evaluate the importance of leaf size as an indicator of Black-breasted Button-quail habitat.

## 2.4 Potential BBQ Habitat

Historical and current Black-breasted Button-quail records from the Fitzroy Basin and adjacent areas were matched to remnant vegetation including plantations. Data on patch size, RE type and general vegetation type were analysed.

# 3. Results and Discussion

## 3.1 Mapping

The map produced in collaboration with the FBA provides a basis to further the conservation prospects of the Black-breasted Button Quail. Older records frequently coincided with non-remnant vegetation reflecting clearing since birds were sighted. Examples of this were Henry Nix’s records from the 1960s in the Dawson Catchment for which he noted that many of the scrubs were cleared subsequent to his surveys (Bennett 1985; Hamley *et al.* 1997). The map prepared by FBA provides a template of target vegetation for surveys and a basis for future mapping of areas of higher conservation value.

## 3.2 Surveys

Six sites were surveyed, some repeatedly (Figure 3, Table 2). No new Black-breasted Button-quail sites were found during the survey period of this study although eight were discovered in an earlier



period of sampling in 2004-05 (Table 3). The percentage of remnant patch searched was generally greater than 20% except at Prior Park and Bajool Limestone Quarry (both 10%). Area searched at each site ranged from 10 ha to 100 ha.

Typically, the area of the habitat used by Black-breasted Button-quail was less than 5% of the searched area; and in four of the six sites this was less than 1% (Table 3); reflecting the difficulty in locating Black-breasted Button Quail. Although Black-breasted Button Quails occupied approximately 2 ha of habitat at one site (Belgamba), at most sites the area occupied was less than 5000 m<sup>2</sup> (½ ha) and typically just a few hundred square metres. This emphasises the difficulty in locating Black-breasted Button Quails, there is a large amount of available habitat and the area occupied is a very small percentage of it.

At most sites where Black-breasted Button Quails were found, a large percentage of the site had to be searched before platelets were located; all but one site requiring more than 50% to be searched before finding the platelets.



**Figure 3: Location of sites surveyed (circles represent newly surveyed sites, triangles are monitoring sites)**



**Table 2: Sites surveyed**

<b>Location</b>	<b>Site</b>	<b>Date</b>	<b>BBBQ present that survey</b>	<b>Comments</b>
<u>Newly searched sites</u>				
Mt Archer	Northern footslopes of the Mt Archer National Park	01-Dec-10	no	substrate very rocky, lot of Coral berry; scrub burnt out in places and very weedy and grassy
Fishing Creek	Beach Scrub south of Corio Bay	14-Dec-10	no	
		23-Feb-11	no	
Gogango Range	Stewart Adams property	01-Oct-11	no	
<u>Known BBBQ sites</u>				
Belgamba	Herbert's	09-Dec-10	yes	little leaf litter present*; platelets and male chest feather found
		17-Feb-11	no	none seen; no platelets
Capricorn Resort	Ridge near lookout	14-Dec-10	no	good fine leaf litter but no platelets seen
		23-Feb-11	no	none seen; no platelets
Capricorn Resort	Beach Scrub adjacent to resort	14-Dec-10	no	very good fine litter; no platelets seen
		23-Feb-11	no	none seen; no platelets

\*possibly due to prolonged wet conditions, no dry spell favouring formation of leaf litter; also, on steeper slopes, rain appears to have washed litter away

**Table 3: Overview of sites surveyed and Black-breasted Button-quail sites identified in the region since 2004**

Site	Date searched	Search time (effort)	Size of remnant (ha)	Area searched (ha)	% of remnant patch searched	Area with platelets (ha)	% of area searched that is occupied by BBBQ	% of area searched prior to finding evidence
<u>2004-09 searches</u>								
Capricorn Resort - lookout	Aug-04	1 hr	60	20	33.33	0.03	0.15	10
Belgamba	Sep-04	2 hrs	130	50	38.46	2.00	4.00	50
Prior park (adjoins Quarry scrub)	Sep-04	1 hr	200	10	5.00	0.05	0.50	50
East of Limestone Quarry*	Nov-04	1 hr	200	10	5.00	not found	na	na
Coominglah scrub	Sep-04	2 hrs	100	100	100.00	not found	na	na
Dad Dan scrub	Sep-04	2 hrs	350	100	28.57	0.01	0.01	90
Hummock Hill Island**	Jul-05	2 hrs	40	20	50.00	0.20	1.00	90
Expedition Range, east of Rolleston	Sep-09	1/2 hr	100	25	25.00	0.50	2.00	96
Cluden	Mar-06	nr	10	10	100	not found	na	na
<u>2010-11 searches</u>								
Fishing Ck - beach scrub south of Corio Bay	Dec-10	3 hrs	70	50	71.43	not found	na	na
Mt Archer north	Dec-10	3 hrs	160	50	31.25	not found	na	na
Gogango Range	Oct-11	1 hr	45	15	33.33	not found	na	na

Note that two points are not shown: Bulburin which was based on point searches from a vehicle of a large area (9600 ha) and there are no data for the Capricorn Resort – scrub site

\*re-surveyed in March 05 and Nov 05

\*\* 40 ha in lenses of a larger patch of 200 ha

Of the three known sites that were re-surveyed, Black-breasted Button-quail were found only at Belgamba. Their apparent absence from the two Capricorn Resort sites in December 2010 and February 2011 suggests a possible seasonal use of these sites with presence previously reported for September-October (they were present in these months in 2004, 05 and 06), corresponding to the onset of breeding in Black-breasted Button Quail. However, this interpretation must be viewed with caution as understanding of the species movement patterns and occupancy are still inadequate.

A further complicating factor is that detectability of Black-breasted Button-quail is largely dependant on platelet formation; a lack of platelets may not necessarily indicate an absence of quails. Platelet formation is influenced by foraging technique and the presence of an adequate leaf litter layer. Wetter years such as the 2010-11 period may influence platelet formation both because of changes in litter cover and foraging habit:

1. For example, at Belgamba (a known Black-breasted Button-quail site) the amount of litter volume was relatively low in comparison to most years, presumably reflecting the lack of a dry season in late 2010. In normal rainfall years, the dry season months of September-October correspond to the period of greatest leaf fall in dry rainforests as a consequence of seasonal moisture stress (Eamus and Prior 2001; Prior *et al.* 2003) but this was not the case in 2010-11.
2. Black-breasted Button-quail do not always form platelets when foraging (McConnell and Hobson 1995) and have been observed feeding by simply walking and pecking (Hughes and Hughes 1991). In drier years, invertebrates may be more likely found under the leaf litter where moisture is retained, and the foot pivoting foraging techniques that lead to platelet formation are required to capture them; whereas in wetter years simple foraging techniques such as pecking at the surface are all that are required. A recent study of epigaeic invertebrates in which a decline in surface active invertebrates in drier years in comparison to average rainfall years was observed (Houston and Melzer 2012), provides support for this theory.

The relatively more successful survey periods of 2004-07 & 09 (eight sites found) corresponded to below average rainfall years whereas the relatively unsuccessful surveys of 2010-11 corresponded to well above average rainfall years (Figure 4). It is possible that this difference in relative success of surveys was also related to differences in platelet formation (or detectability) in wetter and drier climatic phases: during wetter climatic cycles the leaf fall in the late dry season may not be as intense reducing the likelihood of platelet formation and/or foraging habits of the birds may be altered by either differences in litter depth or invertebrate food availability. Thus, surveys for Black-breasted Button-quail may be more effective during drier climatic cycles.

However, such patterns of observability may also be related to longer term trends in habitat occupancy but more data is required in order to determine this. If there are long term patterns in population density/habitat occupancy as a consequence of interannual trends in rainfall patterns, then this has implications for monitoring of bird populations and evaluating habitat condition.

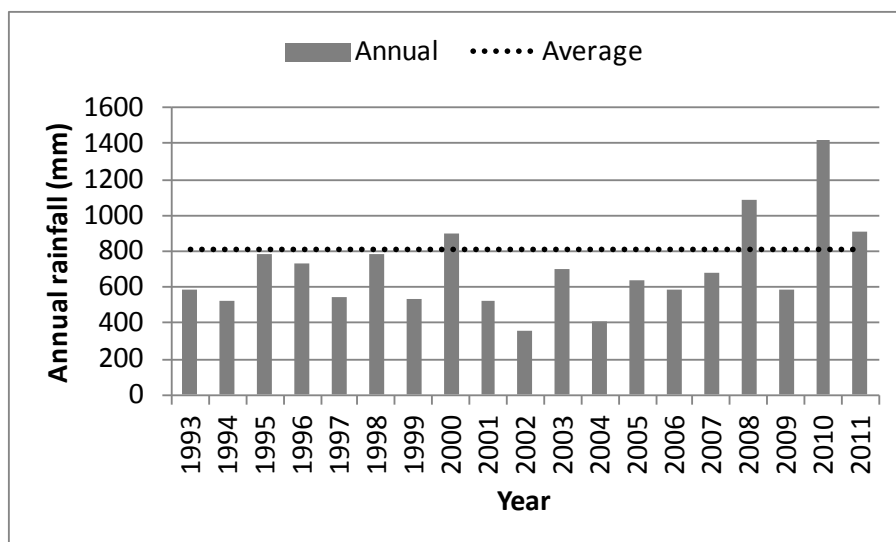


Figure 4: Annual rainfall at Rockhampton since 1993 compared with long-term average (1940-2011). Surveys during the relatively dry period of 2004-07 & 2009 were relatively more successful in locating Black-breasted Button-quail than during the later wetter period of this study (2010-11).

### 3.3 Microhabitat assessment

Canopy attributes of the Black-breasted Button-quail sites conform to the dry rainforest model with the combined cover of the canopy and mid-strata vegetation greater than 70% as is typical of closed forests (Fig. 5). The analogue site had relatively lower canopy cover than the other sites.

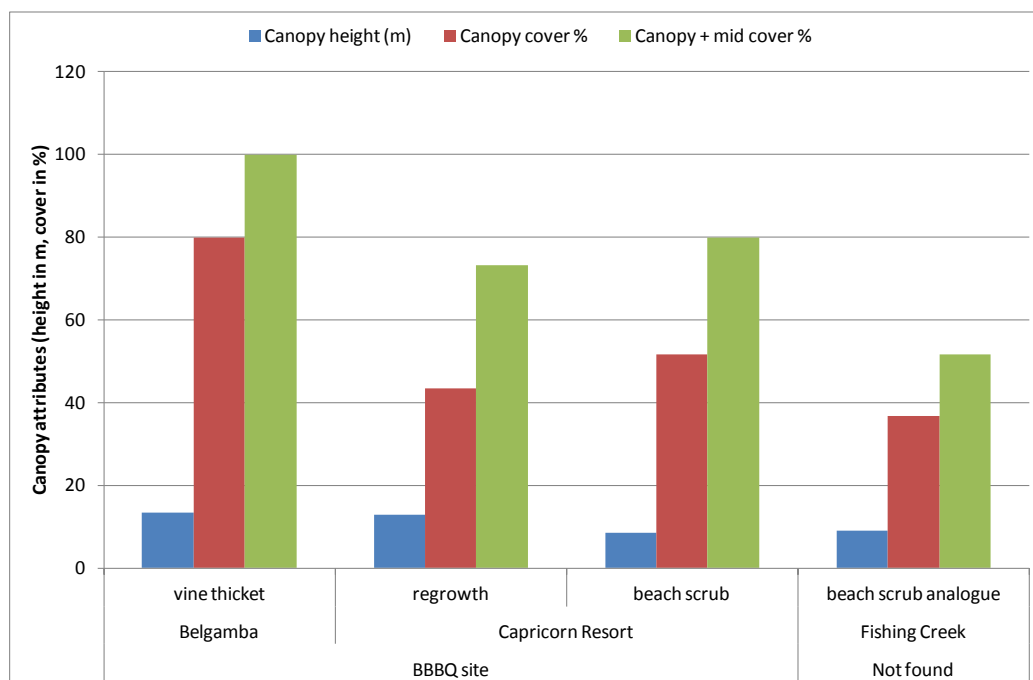


Figure 5: Canopy attributes of four sites, three where Black-breasted Button-quail are found and one not

Basal area (an index of tree biomass), tree and shrub density of the three Black-breasted Button-quail sites were similar whereas the analogue site had a much greater density of shrubs but was similar for the other stand attributes (height and basal area) (Fig. 6).

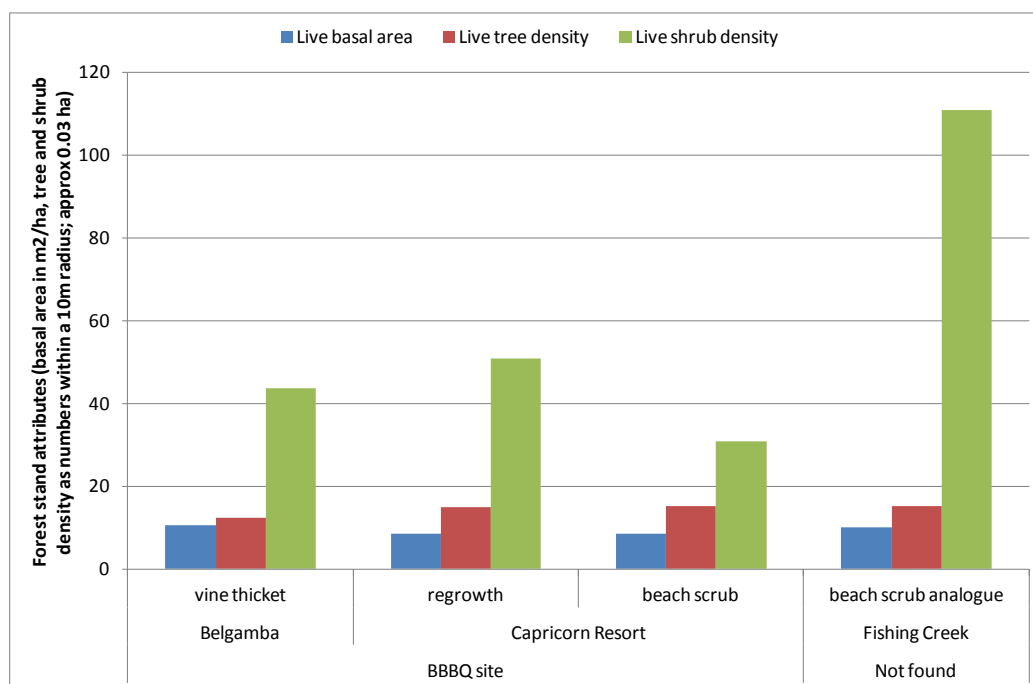


Figure 6: Forest stand structural attributes of four sites, three where Black-breasted Button-quail are found and one not

Weed cover was relatively high at two Black-breasted Button-quail sites, with Lantana comprising 20% of the understorey at one site (Fig. 7). The other common weed was Coral Berry (*Rivina humilis*).

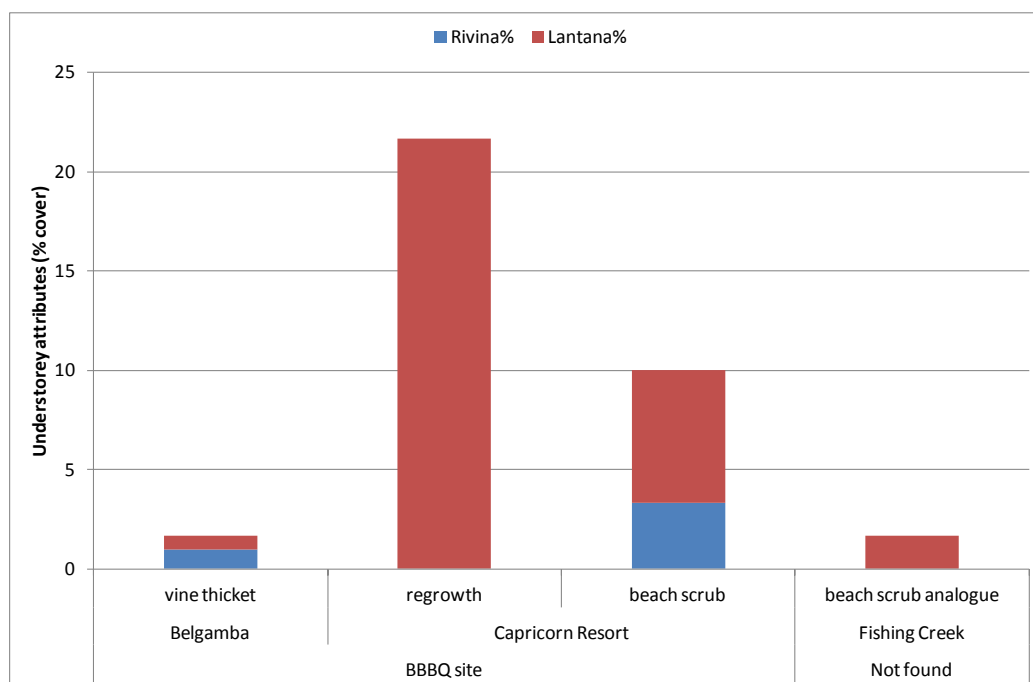


Figure 7: Understorey attributes of four sites, three where Black-breasted Button-quail are found and one not

Groundcover was high in all sites (>70%) and all were generally dominated by litter rather than live vegetation (Fig. 8).

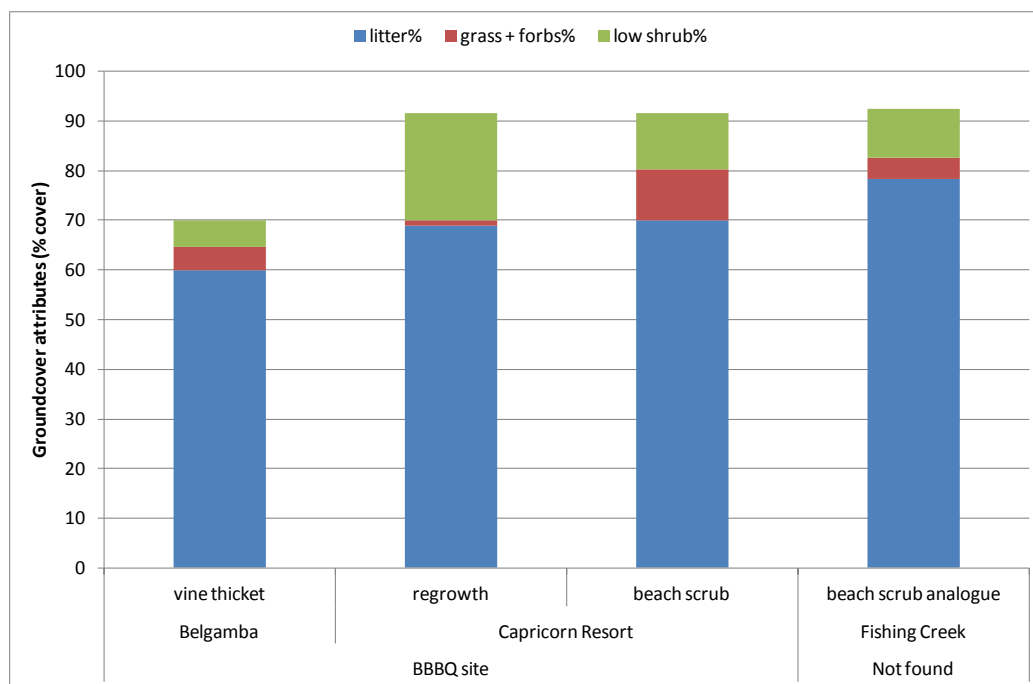


Figure 8: Groundcover attributes of four sites, three where Black-breasted Button-quail are found and one not

Most leaves were in the microphyll size range (i.e. 2.5 to 7.6 cm), confirming that these are microphyll vine forests. Smaller-sized leaves (nanophyll and microphyll) comprised 70% or more of the litter at all four sites (Fig. 9). The two dry rainforest dominant sites where Black-breasted Button-quail occurred had more than 80% of leaves classified as microphyll or smaller (Fig 9).

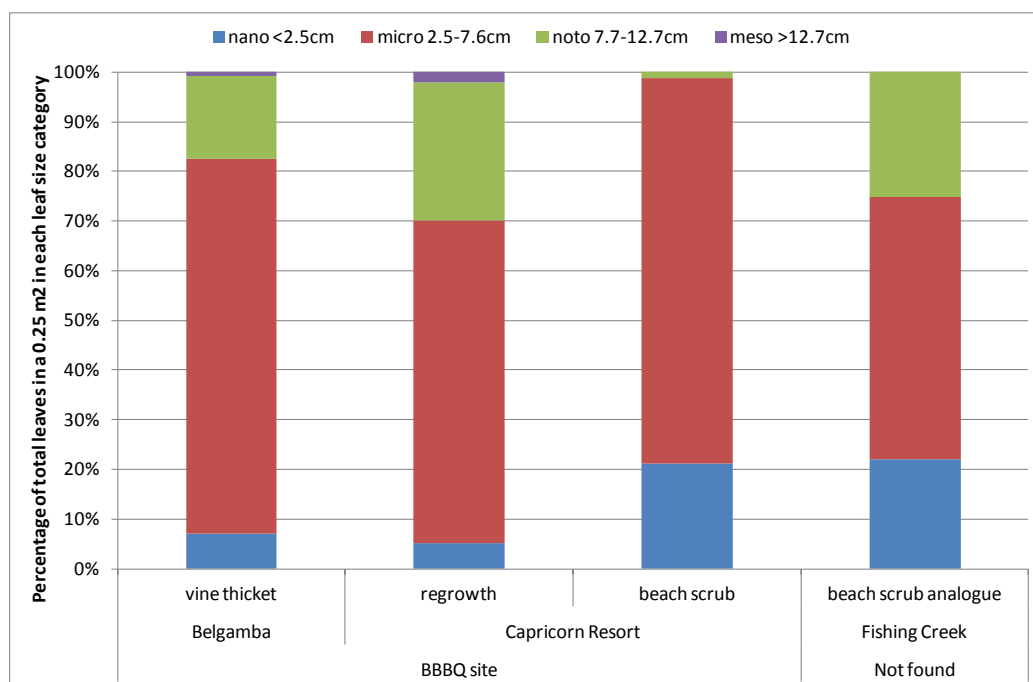


Figure 9: Percentage composition of litter leaf sizes of four sites, three where Black-breasted Button-quail are found and one not

Overall, the presence of a relatively dense canopy, sparse groundstorey vegetation and dense leaf litter cover conforms to the general model of preferred Black-breasted Button-quail habitat. An additional component may be the dominance of relatively smaller leaves in the leaf litter (microphyll size).

### 3.4 Evaluation of potentially important BBBQ sites

Most Black-breasted Button-quail sites were in areas of intact vegetation greater than 50 ha (14 of the 19 sites); only five being less than 50 ha in size (10, 12, 30, 40 and 45 ha respectively) but in all cases these patches were bordered by relatively large areas of remnant vegetation; and two of the five were subdominant components of larger patches in excess of 50 ha (e.g. Hummock Hill Island). Eleven of the sites were greater than 100 ha in size (Fig. 10) confirming the importance of conserving larger patches.

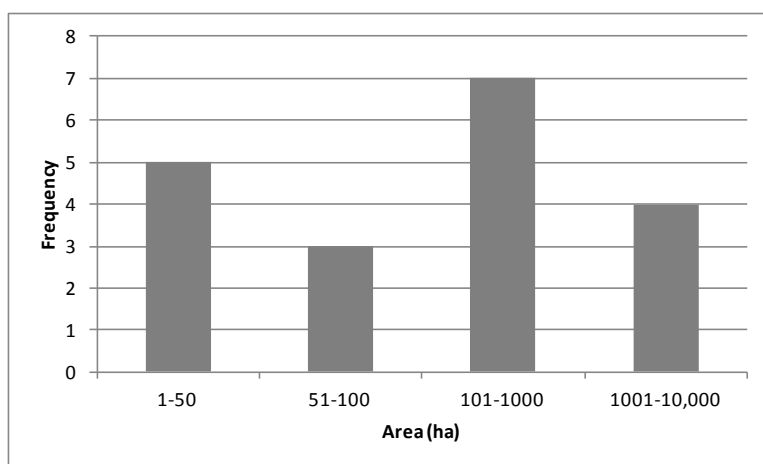


Figure 10: Histogram of the area of the Black-breasted Button-quail sites

Using both the current and historical records, there were 19 sites which matched intact remnant vegetation (or plantation) based on the Queensland Government 2006 RE mapping (Table 4). All were typified by the presence of closed canopy type of vegetation (i.e. greater than 70% canopy cover) either dominantly or as an important component of the forest, except one which was associated with a woodland RE (11.3.3). However, this was an old record from the early 1900's for the Town Common at Rockhampton; a highly disturbed patch of remnant vegetation and possibly much different to the original vegetation. Another of the 19 was a non-remnant pine plantation, matching use of such habitats in south-east Queensland (Smith *et al.* 1998; Lees and Smith 1999; Garnett *et al.* 2011). Of the remaining 17 records, nine coincided with a dry rainforest RE as the dominant vegetation type (>70% of the patch) and five sites had a dry rainforest RE as a subdominant component within woodlands. A further two coincided with a vegetation type described as having patches of dry rainforest in a Brigalow community. The remaining site had relatively closed canopy patches of dense Acacia regrowth within a woodland mosaic. Thus, overall, most sightings occur where dry rainforest vegetation types are dominant or subdominant (Fig. 11).

The RE type in which Black-breasted Button-quail was found most frequently in the region (based on limited records) is 11.11.5 (either the dominant RE type or the dominant closed canopy RE type at 5 sites; and subdominant at another). In addition, although mapped as non-remnant, this was the



dominant vegetation at the recently identified Prior Park site. RE 11.11.5 is described as “Microphyll rainforest (with or without *Araucaria cunninghamii* emergents) and semi-evergreen vine thicket”.

**Table 4: List of RE types and frequency of occurrence used by Black-breasted Button-quail in the region**

RE code	No. sites	RE description
<u>Remnant</u>		
<u>Dry rainforest</u>		
8.2.2	1	Microphyll vine forest (beach scrub) on coastal dunes. Characteristic species include <i>Mimusops elengi</i> , <i>Ganophyllum falcatum</i> , <i>Diospyros geminata</i> , <i>D. compacta</i> , <i>Pouteria sericea</i> , <i>Pleiogynium timorense</i> , <i>Drypetes deplanchei</i> , <i>Eugenia reinwardtiana</i> , <i>Cupaniopsis anacardioides</i> .
11.3.11	1	Semi-evergreen vine thicket on alluvial plains
11.9.4a	1	Semi-evergreen vine thicket or <i>Acacia harpophylla</i> with a semi-evergreen vine thicket understorey. Occurs on crests, mid-slopes, undulating plains and rises formed from fine-grained sediments.
11.9.8	1	<i>Macropteranthes leichhardtii</i> thicket on Cainozoic to Proterozoic consolidated, fine-grained sediments. Lowlands.
11.11.18	1	Semi-evergreen vine thicket. Occurs on undulating plains, rises and gentle slopes of ranges formed on moderately to strongly deformed and metamorphosed sediments and interbedded volcanics.
11.11.5	5	Microphyll rainforest (with or without <i>Araucaria cunninghamii</i> emergents) and semi-evergreen vine thicket. Floristics and structure varies with site. There is usually a continuous tree canopy (9 - 15m high) with a wide range of species including <i>Flindersia australis</i> , <i>Backhousia sciadophora</i> , <i>Excoecaria dallachyana</i> , <i>Melia azederach</i> , <i>Ficus</i> spp., <i>Strychnos arborea</i> , <i>Macropteranthes leichhardtii</i> and <i>Alstonia constricta</i> . An emergent tree layer (12- 20m high) commonly occurs with species including <i>Brachychiton australis</i> , <i>B. rupestris</i> , <i>Flindersia australis</i> , <i>Ficus</i> spp. <i>Araucaria cunninghamii</i> and sometimes <i>Eucalyptus</i> spp. There is a shrub layer (1-3m high) with density depending on canopy cover and frequent species including <i>Croton</i> spp., <i>Abutilon</i> spp., <i>Capparis</i> spp., <i>Acalypha eremorum</i> and <i>Codonocarpus attenuatus</i> . Ferns, mosses and vines are common. Occurs on hilly terrain with slopes ranging from 55 and up to 80% locally. Formed from Mesozoic to Proterozoic moderately to strongly deformed and metamorphosed sediments and interbedded volcanics. Associated soils are generally shallow loams and clays with minor areas of deeper cover. Major vegetation communities include; 11.11.5a; Vine thicket, usually with no <i>Araucaria cunninghamii</i> emergents.
11.12.4	1	Semi-evergreen vine thicket and microphyll vine forest ± <i>Araucaria cunninghamii</i> . <i>Eucalyptus moluccana</i> often associated with lower slopes on andesites. Occurs on low hills, ranges and boulder strewn slopes formed from Mesozoic to Proterozoic igneous rocks including granite. Major vegetation communities include; 11.12.4a; Semi-evergreen vine thicket with open patches of <i>Acacia fasciculifera</i> , <i>Archidendropsis thozetiana</i> , <i>Pleiogynium timorense</i> and various other species.
12.11.4	1	Semi-evergreen vine thicket and microphyll vine forest ± <i>Araucaria cunninghamii</i> . <i>Eucalyptus moluccana</i> often associated with lower slopes on andesites. Occurs on low hills, ranges and boulder strewn slopes formed from Mesozoic to Proterozoic igneous rocks including granite. Major vegetation communities include; 11.12.4a; Semi-evergreen vine thicket with open patches of <i>Acacia fasciculifera</i> , <i>Archidendropsis thozetiana</i> , <i>Pleiogynium timorense</i> and various other species.

RE code	No. sites	RE description
12.12.16	1	Notophyll vine forest on Mesozoic to Proterozoic igneous rocks. Characteristic species include <i>Araucaria bidwillii</i> , <i>A. cunninghamii</i> , <i>Argyrodendron trifoliolatum</i> , <i>Argyrodendron</i> sp. (Kin Kin W.D. Francis AQ 81198), <i>Choricarpia subargentea</i> , <i>Brachychiton discolor</i> , <i>Beilschmiedia obtusifolia</i> , <i>Diospyros pentamera</i> , <i>Grevillea robusta</i> , <i>Gmelina leichhardtii</i> , <i>Ficus macrophylla</i> and <i>Sloanea woollsii</i> . <i>Eucalyptus</i> spp. especially <i>E. siderophloia</i> , <i>E. propinqua</i> and <i>E. grandis</i> may be present as emergents.
<u>Woodland</u>		
11.9.5	2	Open-forest dominated by <i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> . Open-forest dominated by <i>C. cristata</i> is more common in southern parts of the bioregion. A prominent low tree or tall shrub layer dominated by species such as <i>Geijera parviflora</i> and <i>Eremophila mitchellii</i> , and often with semi-evergreen vine thicket species is often present. The latter include <i>Flindersia dissosperma</i> , <i>Brachychiton rupestris</i> , <i>Excoecaria dallachyana</i> , <i>Macropteranthes leichhardtii</i> and <i>Acalypha eremorum</i> in eastern areas, and species such as <i>Carissa ovata</i> , <i>Owenia acidula</i> , <i>Croton insularis</i> , <i>Denhamia oleaster</i> and <i>Notelaea microcarpa</i> in south-western areas. <i>Melaleuca bracteata</i> may be present along watercourses. Occurs on Cainozoic to Proterozoic consolidated, fine-grained sediments. The topography includes gently undulating plains, valley floors and undulating foot slopes and rarely on low hills. The soils are generally deep texture-contrast and cracking clays. The cracking clays are usually black or grey to brown or reddish-brown in colour, often self mulching and sometimes gilgaied in flatter areas. Some texture contrast soils are shallow to only moderately deep.
11.11.4b	1	<i>Corymbia trachyphloia</i> or <i>Eucalyptus acmenoides</i> , <i>E. crebra</i> woodland +/- <i>Acacia leiocalyx</i>
11.3.3	1	<i>Eucalyptus coolabah</i> woodland on alluvial plains
<u>Non-remnant</u>		
Plantation	1	Pine

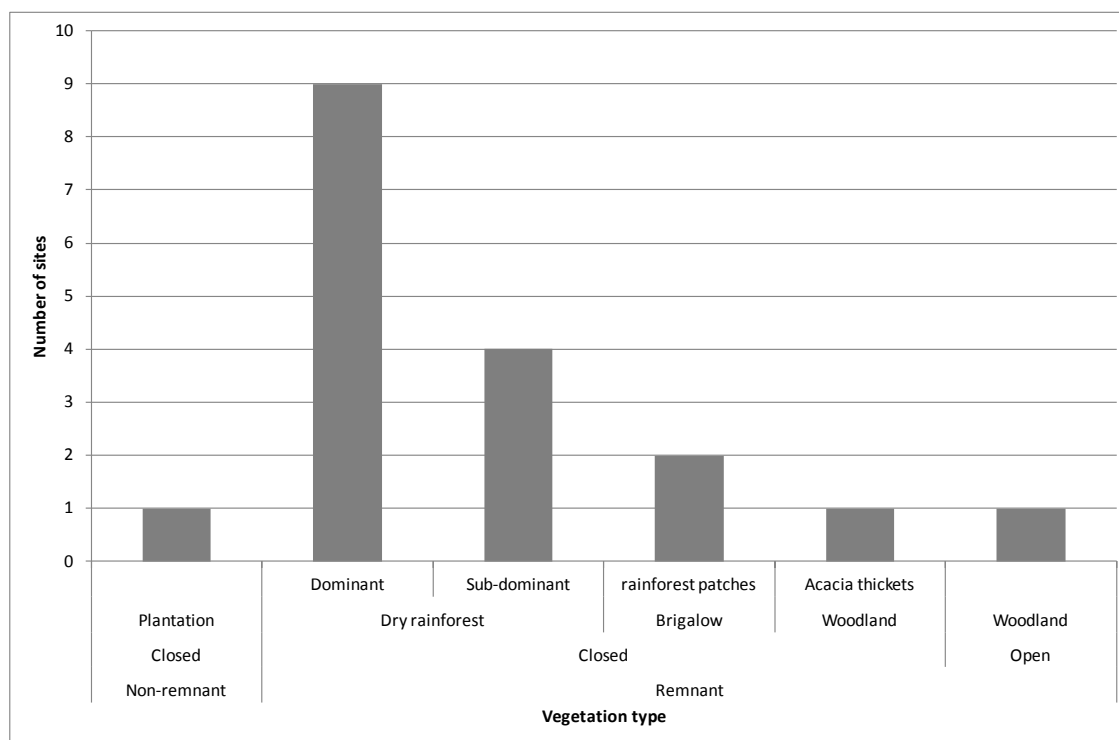


Figure 11: Classification of Black-breasted Button-quail sites by general vegetation type



Examples of Black-breasted Button-quail habitat are shown in Figures 12 to 14.



**Figure 12: Belgamba - Microphyll rainforest and semi-evergreen vine thicket vine thicket (RE 11.11.5)**



**Figure 13: Capricorn Resort –Ridge regrowth woodland with dense patches of Acacia regrowth (RE 11.11.4b)**





**Figure 14: Capricorn Resort -beach scrub (RE 8.2.2)**

Using the sites where Black-breasted Button-quail have been previously recorded and intact forested vegetation remains, conservation importance has been evaluated (Table 5). Sites with large patches of intact dry rainforest have greatest priority. Some sites need further evaluation to determine if they are currently regularly used by Black-breasted Button Quail; others need to be assessed for condition.

Black-breasted Button-quail habitat is typified by large intact patches of predominantly dry rainforest with good connectivity. RE types such as Brigalow with patches of SEVT should also be considered (e.g. 11.9.5) (see Appendix 1 for a draft protocol). Some potential habitat sites are listed in Appendix 2 (mainly for the Dawson as this catchment has lost more documented Black-breasted Button-quail habitat than others). A draft 'fact Sheet' for landholders who might be interested in the Black-breasted Button-quail has been prepared (Appendix 3).

**Table 5: List of sites at which Black-breasted Button-quail have been sighted (historical and current records) in the region that match remnant vegetation or plantation plus geocoordinates, forest type, RE type, area and conservation ranking and actions required.**

Ranking scales are 1 to 4 - Condition: poor, fair, good, very good. Ranking of value for conservation: low, medium, high, very high

Map Code	Site	Lat	Long	General forest type	RE type	Area of extant patch (ha)	Condition	Decade of discovery if known	Habitat use	Ranking of value for conservation	Research action	Conservation action required
QB5	Glenhaughton Rd, Taroom	-25.4166667	149.5000000	woodland with dry rainforest patches	11.9.5a(100%)	10	not known	1960	?	?	investigate condition	
QB9	Belgamba	-23.6311890	150.4561840	dry rainforest	11.3.26/ <u>11.11.5 (40%)</u>	130	very good	2000	regularly present	very high		Probably none as under Nature Refuge protection & adjacent to a National Park
QH2	Bouldercombe Gorge Reserve	-23.6216670	150.4725000	dry rainforest	11.3.26/ <u>11.11.5 (40%)</u>	130	not known, although very close to Belgamba	?	?	?	investigate condition	
QB10	Bulburin	-24.4969450	151.4822260	rainforest	12.12.16 (100%)	9600	mixture of vine thicket & hoop pine plantation but in relatively good condition	2000	?	high	habitat use	None?/ Remnants bordering the plantation are managed by DERM
QB11	Dan Dan	-24.1562460	151.0843370	dry rainforest	12.11.4 (90%)	1200	good	2000	?	high	investigate habitat use	None?/ Has some conservation tenure

Distribution of Black-breasted Button-quail in the Fitzroy Basin, and extent and condition of remnant dry rainforest habitat

Map Code	Site	Lat	Long	General forest type	RE type	Area of extant patch (ha)	Condition	Decade of discovery if known	Habitat use	Ranking of value for conservation	Research action	Conservation action required
QB12	Prior Park	-23.8011430	150.6816310	dry rainforest	11.11.5	450	very good	2000	?	very high	investigate habitat use <u>&amp; of the adjacent scrub to the east</u>	Is fenced/ investigate possibility of Nature Refuge agreement
QB15	Capricorn Resort - lookout	-23.0285820	150.7238970	regrowth woodland	<u>11.11.4b</u> (70%)/11.11.4c	60	good	2000	regular seasonal use	high (due to regular use coinciding with breeding season)		Discuss with landholder
QB16	Capricorn Resort - scrub	-23.0495430	150.7685700	dry rainforest	8.2.2	50	very good	2000	?	high if include additional scrub to the north to Corio Bay		Discuss with landholder
QB17	Expedition Range, East of Rolleston	-24.6317390	149.0110410	dry rainforest	11.9.8 (100%)	200	very good	2000	?	high	habitat use	Recognised as 'significant remnant vegetation'
QH4	Byfield	-22.8317559	150.6677419	plantation	plantation	400	poor	?	?	low	none	none
QH6	Dawson River - near Coomooboolaroo	-23.8650861	149.6844243	woodland with dry rainforest patches	11.9.5 (100%)	45	not known	?	?	?	investigate condition	
QH8	Gravel Creek area	-23.8948061	151.0866119	dry rainforest	11.11.4/11.3.4/ <u>11.3.11</u> (30%)	30	not known	1990	?	?	investigate condition	
QH9	Gravel Creek area, S of Aldoga	-23.8839767	151.0905137	dry rainforest	11.11.4/11.11.15/11.11.4c/ <u>11.11.5</u>	90	not known	1990	?	?	investigate condition	

Distribution of Black-breasted Button-quail in the Fitzroy Basin, and extent and condition of remnant dry rainforest habitat

Map Code	Site	Lat	Long	General forest type	RE type	Area of extant patch (ha)	Condition	Decade of discovery if known	Habitat use	Ranking of value for conservation	Research action	Conservation action required
					(10%)/11.11.18 (10%)							
QH12	Mt Ramsay	-24.2567479	149.8844232	dry rainforest	11.9.4a (70%)/11.10.1	150	not known	?	?	?	investigate condition	
QH13	Nerimbera - Vine scrub SW of mining homestead lease, surrounded by Timber Reserve 46.	-23.3269035	150.6178621	dry rainforest	11.12.4	1600	not known	1990	?	?	investigate condition	
QH15	Pine Mt - Ridgeline on Timber Reserve 96. TR96	-22.7562076	149.8547164	dry rainforest	11.11.5	1200	not known	1990	?	?	investigate condition	
QH22	Rockhampton-Town Common	-23.3817551	150.5344119	woodland	11.3.3	150	not known	?	?	?	investigate condition	



## 4. Conclusions

1. Platelets are not a reliable method for determining the presence of Black-breasted Button-quail in well above average rainfall years. Thus, to optimise identification of new sites, it is recommended that surveys for this species be carried out during drier climatic phases.
2. Long term population trend monitoring may also be skewed by differences in detectability. For monitoring programmes, it is recommended that most emphasis should be placed on the results of the population estimates from before and after the wetter climatic phase. In central Queensland, La Niña years tend to be a relatively short sequence in comparison to the below average rainfall El Niño phases.
3. Overall, the presence of a relatively dense canopy, sparse groundstorey vegetation and dense leaf litter cover conforms to the general model of preferred Black-breasted Button-quail habitat. An additional component may be the dominance of relatively smaller leaves in the leaf litter (microphyll size).
4. Black-breasted Button-quail habitat is typified by large intact patches of predominantly dry rainforest with good connectivity.
5. A number of sites with the potential to provide high quality habitat for Black-breasted Button-quails have been identified and a method to identify potential sites developed.

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## 5. Appendices

### Appendix 1: Characteristics of high quality habitat

High quality habitat includes:

- a large area, preferably at least 100 ha but 50 ha acceptable\*
- preferably connected to other forest area
- a reasonably continuous canopy (>70% cover) and a well shaded understorey
- SEVT of some sort, particularly Bottle Tree scrub and RE 11.11.5
- a ground layer dominated by open areas with thick litter but some patches of dense shrub
- a dominance in the canopy of small-leaved litter providers.

\*but can be a series of lenses within open woodland (e.g. Inskip Point, Hummock Island)

### Appendix 2: Possible Black-breasted Button-quail sites in the Dawson catchment and others

Catchment	Site	Lat	Long	Size	Comments
Dawson	Mourangee-Eastlands Ck	-23.682946	149.840407	60 ha, 130 ha	
Dawson	Herbert Ck	-23.716355	149.889396	80 ha	
Dawson	Palmgrove NP	-24.936527	149.366487	140 ha	
Dawson	Palmgrove NP	-24.971892	149.292858	200 ha	
Dawson	Gurulmundi Scrub	-26.398795	149.896231	80 ha	Contact A. Clark
Dawson	Gurulmundi SF	-26.384902	149.883079	40 ha	
Dawson	Combabula SF	-26.307540	149.479181	240 ha	
Dawson	Barakula SF	-26.360532	150.424831	700 ha	
Dawson	Carnarvon NP	-24.697630	147.704630	50 ha	
Dawson	Carnarvon NP	-24.699423	147.683765	80 ha	
Dawson	Carnarvon NP	-24.688419	147.662485	300 ha	
Connors	East of Clarke Ck	-22.625935	149.377693	140 ha	
Coastal	West of Clairview	-22.097523	149.408945	360 ha	
Fitzroy	Bajool-Mt Bomboolba	-23.781953	150.708212	1250 ha	
Herbert	Bukkulla	-22.743480	149.865790	300 ha	lowland stand

### **Appendix 3: Fact Sheet Draft**

The Black-breasted Button-quail is about the size of a Brown Quail, with distinctive black and white markings on the chest. The female is larger and more boldly marked. They are restricted to limited forest habitats with a dense canopy and an open ground layer with some low shrubs and plentiful leaf litter in which they forage for small invertebrates. Clearing of dry rainforest 'vine scrubs' has caused a serious drop in numbers and distribution, and they are listed as 'vulnerable' under Queensland and Australian law.

They are found from north of Rockhampton near Marlborough to northern NSW, and inland to near Rolleston, in dry rainforest, beach scrubs and shrubby wattle regrowth in some coastal areas. There are a number of populations in Central Qld, but not much is known about them.

Black-breasted Button-quail nest on the ground and are unusual in that the male broods and cares for the young.

#### **Looking for Black-breasted Button Quail**

Black-breasted Button-quail are usually found by the presence of 'platelets'. These are saucer like depressions scratched through the leaf litter to the soil below. Black-breasted Button-quail turn on one foot as they scratch and catch invertebrates, so the platelets are neatly circular. Once fresh platelets are found it is sometimes possible to hear the birds scratching leaves nearby and then see them in action.

#### **Are they the only birds which make platelets?**

Other Button-quail also make circular platelets at times, and Painted Button-quail platelets are sometimes seen in Central Qld. However, these are mostly found in open grassy woodland habitat.