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Front Cover: Adult female and juvenile male Chowchilla, July 2022, Lake Barrine on Atherton Tableland, Far North Qld. Photo by Vince Bugeja

Changes in the avifauna of disturbed Wet Tropical rainforest, regrowth and pasture at Lake Eacham, Far North Queensland, over 18 years

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Abstract

Long term studies of bird communities in the north Queensland Wet Tropics are rare. On the Atherton Tablelands, bird lists were compiled in 96% of the months from 1992 to 2009, on a ~16 ha farm bordering disturbed tropical rainforest. Cattle were excluded from ~3.4 ha, including patches of regrowth that were ~40–70 years old in 1988 and rainforest plantings. The site was separated by a narrow road from the southern end of the 1.7 km Lakes Corridor, linking two ~500 ha rainforest remnants of Crater Lakes National Park. Of 125 bird species recorded in >10 monthly lists (comprising 16,260 records), 50 species (40%) were typical of intact rainforest in the area, including 21 Wet Tropics endemic species or sub-species and 12 species able to disperse seeds of large fruits, essential for rainforest regeneration. Total records of non-rainforest species decreased significantly over time, and the reporting rates of 13 rainforest-dependent species increased. The study documents the avifauna of the north-east corner of the Lake Eacham rainforest and nearby regrowth, and provides a baseline for comparison with birdlife recruiting to the Lakes Corridor.

Introduction

From the 1880s, large tracts of rainforest were cleared for agriculture in the Wet Tropics bioregion of north-eastern Queensland, including the Atherton Tablelands (Birtles 1997). Bird colonisation of regrowth on former rainforest sites is influenced by land use history and proximity to intact forest (Catterall *et al.* 2004; Freeman *et al.* 2015; Powell *et al.* 2013). Some rainforest-dependent bird species now utilise secondary rainforest (regrowth) (Laurance *et al.* 1996; Grant & Litchfield 2003; Freeman 2015). Nevertheless, this may be sub-optimal habitat for Wet Tropics endemics, terrestrial insectivores, edge-averse species, and birds able to disperse seeds of large fruits, essential for rainforest regeneration (Catterall *et al.* 2004, 2012; Chazdon *et al.* 2009; Freeman *et al.* 2015).

The Crater Lakes National Park on the Atherton Tablelands comprises two "hyper-disturbed" rainforest remnants of ~500 ha (Laurance 1997), surrounding the volcanic crater lakes of Eacham and Barrine. These remnants are separated by a road and ~1.7 km of private land [see maps by Jones (2016) and Scambler & Burchill (2023)]. Initiated in 1997, the Lakes Corridor project (17°16'S, 145°38'E, 734 m asl) links them, utilising revegetation plots, small remnants, and patches of regrowth. The goals of corridor projects are to increase suitable habitat and reconnect sub-populations separated by fragmentation (Tucker 2000), and the avifauna of Lake Eacham is integral to bird colonisation of the Lakes Corridor. A detailed study in 1993–1998, at three Lake Eacham sites ~1–2 km south-east of the corridor, showed the avifauna to be typical of nearby intact rainforest, despite heavy tourist visitation (Scambler & Burchill 2023). However, surveys at Lake Eacham (hereafter 'the National Park') closer to the Lakes Corridor have been limited (Jones 2016; A.N.D. Freeman unpubl. data). In this article I present results of 18 years of bird records (1992–2009) on a property adjoining the National Park, at the southern end of the Lakes Corridor.

Study area and methods

Study site

The study site (Plate 1) was a 16 ha former grazing property at Lake Eacham on the Atherton Tablelands, ~40 km south-west of the city of Cairns. It shares a 530 m boundary with the National Park, separated from the southern end of the Lakes Corridor by a 4 m bitumen road with grassy verges. The soil is basalt (O'Brien & Tucker 2007) and mean annual rainfall recorded on site from 1990 to 2005 was 1,709 mm (range 815–2,869 mm). Rain fell mostly in the Wet season (January–April), with highest falls in years affected by tropical cyclones. A drizzly Cool season (May–August) was followed by a Dry season (September–December), with intermittent storms late in the year. Average temper-
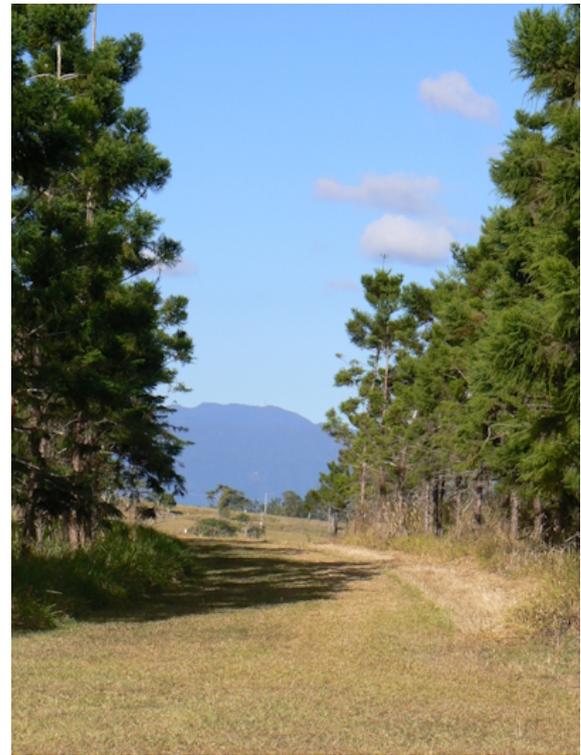
Plate 1. Left: The property in early 1998 looking south (Eagle Eye, Malanda), with paddocks prepared for planting of Hoop Pine *Araucaria cunninghamii* along contours. The triangle shows the southern end of the Lakes Corridor, across the road from the National Park boundary (red line). Right: Hoop Pine and slashed access track, Dry season 2009 (Elinor C. Scambler).

atures on site were 19–27°C (Wet season), 12–22°C (Cool season) and 17–27°C (Dry season), with a range of 8–35°C in most years. There were no streams on the property, but after heavy rainfall some temporary springs emerged. An easement of ~170 m led to a dam on an unnamed tributary of Wright Creek, flowing south-west into the National Park.

The study site was probably cleared by 1913, and was ~2.5 km from the nearest extensive forest (Australian Army 1943; Tucker 2000). In 1949 the farm was part of a 102 ha block leased to a Soldier Settler farmer (Anon. 1949a, b), suggesting a period of abandonment by earlier grazing lessees. Aerial images (QImagery 2025) indicate two areas of regrowth, estimated as aged ~70 years and ~40 years respectively, in 1988. The oldest was well-established by 1949, covering ~10.5 ha along 1 km of the eastern edge of the National Park. This was classed as 'Complex Mesophyll Vine Forest recovering from disturbance' (Regional Ecosystem Type 7.8.2b: Tracey 1982; Queensland Government 2025), with a canopy of Brown Salwood *Acacia celsa*, a rainforest pioneer species living to >50 years (Yeo & Fensham 2014). This habitat followed the course of a partly-overgrown, unmapped clearing within the National Park (pers. obs.), probably a logging or bullock track

from the early 1900s (P. Callaghan pers. comm.).

The second area of regrowth was on the property, and expanded from a small cluster of trees adjoining the National Park in 1949, to ~0.7 ha in 1988 (QImagery 2025). This was classed as a 'remnant' of the same ecosystem as the adjacent recovering rainforest in the National Park, and local botanists identified >200 species of trees, epiphytes and vines. In 1988 there were ~20 scattered trees in farm paddocks (in the same positions as in 1949 imagery), mostly Brown Salwoods, with a few large Atherton Pendas *Xanthostemon whitei* and native figs Ficus spp., probably spared from early clearing.

In 1989 an area of ~3.4 ha was fenced to exclude cattle from the National Park boundary, the remnant, a home paddock of 2 ha, and most isolated trees. A house was built ~75 m from the remnant, and a garden was planted with native shrubs and fruit trees, with three bird baths. In 1990–1996, ~2,000 rainforest trees were planted in the home paddock to connect and extend regrowth patches. In 1997, cattle were removed and ~7,000 Hoop Pines *Araucaria cunninghamii* were planted in a Joint Venture with the Queensland Government (Table 1).

Table 1. Estimated areas of habitat types on the study site in 2009. The area shown for the plantation includes pasture between rows and along drainage lines.

Habitat type	Est. area (ha)
Hoop Pine incl. pasture	11.78
Plantings / remnants	1.40
Mown grass	1.13
Isolated trees, buildings, garden & farm roads	0.97
'Remnant'	0.70
Total	**15.98**

Pasture on drainage lines and access tracks was slashed (Plate 1). In 2004, 400 more rainforest trees were planted in the home paddock. In 2006, Tropical Cyclone Larry felled some trees (mostly Brown Salwoods) on the property and in the National Park, and damaged smaller trees. Even so, in 2007 older restoration plantings were "self-sustaining and developing significant diversity in structure and composition" (O'Brien & Tucker 2007). Due to cyclone damage to Hoop Pine, the Joint Venture was terminated, and pasture was grazed again from 2010.

Bird records and analysis

Bird species on the property and along the National Park boundary were listed in 208 (96%) of the 216 months from 1992 to 2009 (Appendix S1). Only those species (125) recorded in ten or more months were used in the analyses. Appendix S2 lists 34 species not used in analysis. Lists were divided into three six-year stages: Stage 1 (n=71), 1992–1997 (paddocks grazed, home paddock plantings; Stage 2 (n=69), 1998–2003 (Hoop Pine planted); and Stage 3 (n=68), 2004–2009 (cyclone damage 2006, Hoop Pine to ~12 m high in 2009). Fisher's Exact Tests (3 x 2 with Freeman-Halton extension; Soper 2025) were conducted to compare the reporting rates (% of occurrence on lists) of species in the three stages. These tests were also used to explore seasonality of resident species. A reporting rate of ≥80% over all 208 monthly lists was adopted as a simple measure of the most frequently recorded species. Behavioural observations, particularly of foraging and breeding (copulation, adults attending nests with eggs, or adults attending dependent young), were recorded opportunistically.

Bird species were grouped in three functional categories (Appendix S3 and references therein): degree of rainforest dependency, diet guilds and movement ecology. Rainforest dependency classes (Williams 2006) were: 'non-rainforest' (RF0–RF2); 'rainforest not core habitat' (RF3); 'mostly rainforest' (RF4) and 'dependent' (RF5–RF6, RF6 being rainforest obligate). To investigate changes in the avifauna over time, for each functional category, Chi-squared tests for goodness of fit were used to compare the numbers of records on monthly lists in the three stages. To identify important factors contributing to significant Chi-squared results, standardised residuals were calculated with values of >|2| considered as significant. Species from any diet guild able to contribute to rainforest seed dispersal, including seeds of large fruits (20+ mm: Westcott *et al*. 2005), were obtained from Moran *et al*. (2004) and Dennis & Westcott (2006). Species' conservation status and trends in intact forest at mid-altitudes were obtained from Garnett & Baker (2021) and Williams & de la Fuente (2021), respectively. Bird species' names follow the International Ornithological Congress (Gill *et al*. 2025). For simplicity, 'Wet Tropics' is omitted from subspecies' common names in the text; for full names see Supplementary data.

Results

Functional categories and reporting rates of bird species

From 1992 to 2009, 38–99 bird species (median, 80) were recorded each month, totalling 16,375 records. Of 125 species used in analyses (16,260 records, Appendix S4), 56 (45%) were non-rainforest species, 33 (26%) were rainforest-dependent, 17 (14%) were found mostly in rainforest and 19 (15%) occur in rainforest, but not as core habitat (Fig. 1). Rainforest birds included 21 taxa (11 species and ten subspecies) endemic to the Wet Tropics, of which four were obligately associated with rainforest: Bower's Shrikethrush *Colluricincla boweri*, Mountain Thornbill *Acanthiza katherina*, Tooth-billed Bowerbird *Scenopoeetes dentirostris* and Brown Gerygone *Gerygone mouki mouki*. Over 18 years, 15 rainforest-dependent birds were listed in >80% of months, including three edge-averse species (Freeman *et al*. 2015): Bower's Shrikethrush, Wompoo Fruit-Dove *Ptilinopus magnificus keri* and White-throated Treecreeper *Cormobates leucophaea minor* (Table 2). Chowchillas *Orthonyx spaldingii* and Yellow-throated Scrubwrens *Neosericornis citreogularis* were recorded only in the National Park, the remnant, and adjacent 10–12 year old plant-
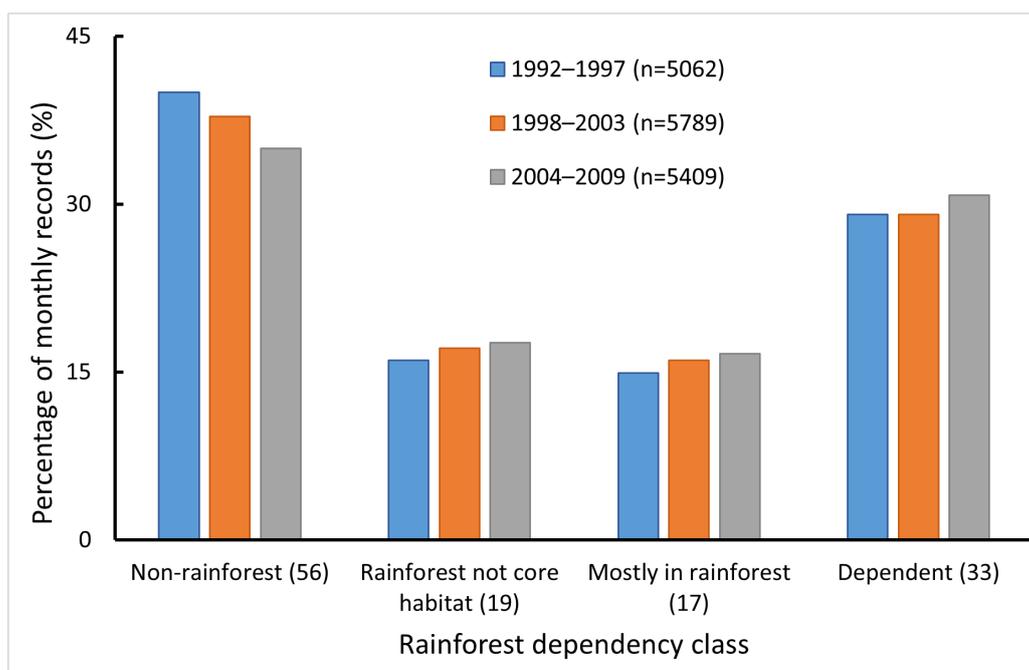
Figure 1. Percentage of records of 125 bird species by rainforest dependency class, recorded in 208 monthly lists during 1992–2009 (*n*, number of records).

Table 2. Rainforest-dependent bird species recorded in ≥80% of monthly lists, 1992–2009 (*n*=208). For scientific names, see Supplementary appendices. *Rainforest obligate taxa in italics*.

Common name	% of lists
Lewin's Honeyeater	100
Orange-footed Scrubfowl	100
Brown Gerygone	99
Australian Swiftlet	97
Bridled Honeyeater	95
Grey-headed Robin	95
Pale-yellow Robin	95
Spotted Catbird	95
Victoria's Riflebird	95
White-throated Treecreeper	95
Topknot Pigeon	94
Macleay's Honeyeater	91
Wompoo Fruit Dove	89
Pacific Emerald Dove	86
Bower's Shrikethrush	84

ings, but other rainforest birds were recorded in new plantings and the house garden.

The frequency of rainforest-dependent species in the farm avifauna changed significantly over the 18 years of the study (χ^2=30.08, *df*=6, *p*<0.001; Fig. 1). The main contributing factors to this result were more records of non-rainforest species than expected in Stage 1, and fewer in Stage 3.

Reporting rates of 50 species increased significantly over the 18 years of the study (Appendix S5). Thirteen were rainforest-dependent, including nine endemic species or subspecies, of which six have been found to prefer intact rainforest over regrowth (Laurance *et al.* 1996; Freeman 2015). Reporting rates of 19 species decreased significantly (Appendix S6), including two rainforest-dependent birds, Tooth-billed Bowerbird (in Stage 3) and Pied Monarch *Arses kaupi*. There was a high turnover in non-rainforest species, with reporting rates for 14 species significantly increasing, and 18 decreasing, over time. There were fewer sightings over time of several hovering or soaring raptors, Australian Pipit *Anthus australis*, White-bellied Cuckoo-shrike *Coracina papuensis*, and the introduced Common Myna *Acridotheres tristis*, while the Brown Goshawk *Tachyspiza fasciata* was among non-rainforest species reported more often. Of 56 species with stable reporting rates (Appendix S7), 18 were dependent on rainforest, including Brown Gerygone, Mountain Thornbill, and Grey Fantail *Rhipidura albiscapa keasti* (Plate 2). A number of rainforest species with increased or stable reporting rates in this study are now declining at mid-altitudes in the Wet Tropics, and some are at risk (Table 3; Appendices S5, S7; Williams & de la Fuente 2021; Garnett & Baker 2021; Kowalski *et al.* 2022).

The most common dietary guilds were arboreal insectivores, frugivores and terrestrial

Plate 2. North-eastern Grey Fantail *Rhipidura albiscapa keasti* in the house garden. © Sandy Carroll.

Table 3. Rainforest-dependent species with significant changes in reporting rates (% of monthly lists, Fisher's Exact Test) between 1992 and 2009. Significant differences are shown as: *** <0.0001, ** <0.001, * <0.01, ~ <0.05. *n*, number of lists; D, disperser of rainforest fruits; DL, disperser of large fruits. Conservation status for species at risk from Garnett & Baker (2021). ↑ or ↓ = trend at mid-altitudes (Williams & de la Fuente 2021). For scientific names, see Supplementary appendices.

Common name	Reporting rate			*p*	Conservation status/ Wet Tropics endemicity and mid-altitude trend
	Stage 1 (*n*=71)	Stage 2 (*n*=69)	Stage 3 (*n*=68)		
Species with significant decrease in reporting rate 1992–2009					
Pied Monarch	17	3	9	~	Endemic
Tooth-billed Bowerbird (D)	58	59	29	**	Near Threatened/ Endemic ↓
Species with significant increase in reporting rate 1992–2009					
Bower's Shrikethrush	68	94	90	***	Vulnerable/ Endemic ↓
Chowchilla	24	32	59	***	Endemic ↑
Double-eyed Fig Parrot	14	52	72	***	Endemic subspecies
Grey Goshawk	28	80	87	***	
Grey-headed Robin	86	100	99	**	Near Threatened/Endemic ↓
Lesser Sooty Owl	65	72	88	*	Endemic
Macleay's Honeyeater (D)	82	97	94	*	Endemic ↑
Pacific Emerald Dove	72	93	93	**	
Satin Bowerbird (DL)	0	6	21	***	Near Threatened/Endemic subspecies
Spectacled Monarch	46	72	66	*	↓
Spotted Catbird (D)	93	91	100	~	Endemic ↓
Topknot Pigeon (DL)	87	97	97	~	
Yellow-breasted Boatbill	18	75	87	***	Endemic subspecies ↑
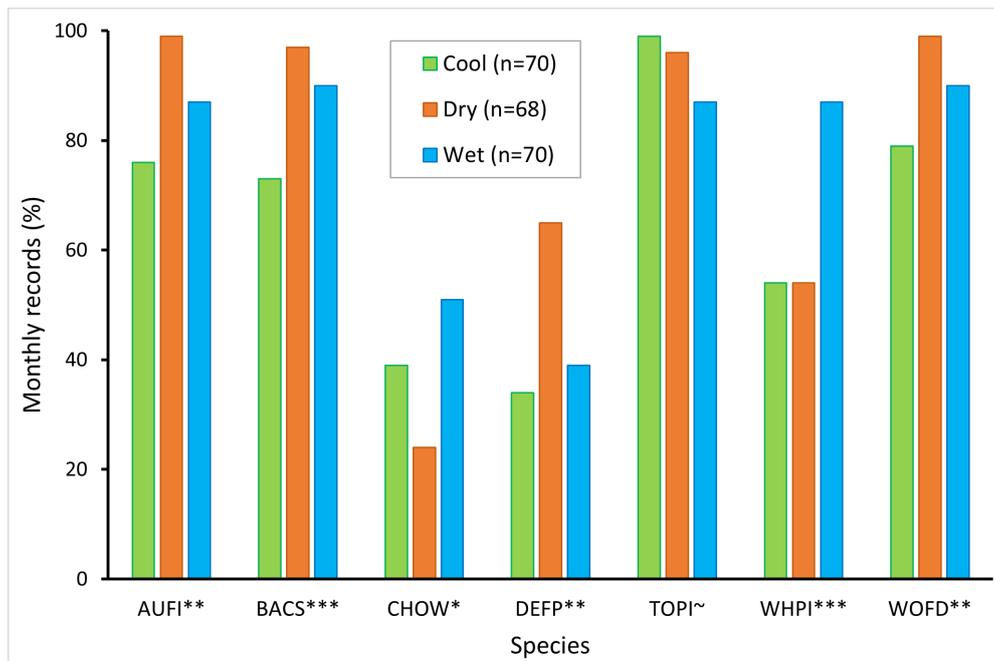
Figure 2. Resident species with significant seasonal variation in reporting rates (% of monthly lists) during 1992–2009 (Fisher's Exact Test). Species abbreviations: AUFI, Australasian Figbird; BACS, Barred Cuckooshrike; CHOW, Chowchilla; DEFP, Double-eyed Fig Parrot; TOPI, Topknot Pigeon; WHPI, White-headed Pigeon; WOFD, Wompoo Fruit Dove. *n*: number of lists; *p* as in Table 3.

insectivores (22%, 20% and 17% of records, respectively). The number of records in each guild did not vary significantly over time ($\chi^2=21.49$, $df=14$, $n=16,260$, $p>0.89$). Of 25 species able to disperse seeds of rainforest fruits, 12 are capable of consuming large fruits (Appendices S5–S7). These included Satin Bowerbird *Ptilonorhynchus violaceus minor* and Topknot Pigeon *Lopholaimus antarcticus*, both reported more often over time. Most monthly records (82%) were of resident species ($n=13,393$). Numbers of records in movement classes did not change over time ($\chi^2=9.12$, $df=6$, $p>0.168$), but the reporting rate of seven residents (Chowchilla and six frugivores) varied significantly between seasons (Fig. 2).

Observations of breeding and foraging behaviour

Breeding was noted in 42 species, 29 (69%) of which were non-rainforest birds. Six rainforest-dependent birds were recorded breeding (Spotted Catbird *Ailuroedus maculosus*, Black-faced Monarch *Monarcha melanopsis*, Brown Cuckoo-Dove *Macropygia phasianella robinsoni*, Eastern Whipbird *Psophodes olivaceus lateralis*, Lewin's Honeyeater *Meliphaga lewinii* and Pale-yellow Robin *Tregellasia capito nana*). Up to four mounds of Australian Brushturkey *Alectura lathami* were active, and young sighted, each year. In July 2002, a sub-

adult Southern Cassowary *Casuarius casuarius* was seen once on the property, and on ten occasions in the Lakes Corridor (presumably the same individual) (Appendix S2; Don and Jill Crawford, pers. comm.). However, the species last bred at Lake Eacham in 1983 (Crome & Moore 1990) and its provenance was unknown. The rainforest-dependent Lewin's Honeyeater, and several species typical of woodlands or forest edges (e.g. Bar-shouldered Dove *Geopelia humeralis*, Sahul Sunbird *Cinnyris frenatus* and Red-browed Finch *Neochmia temporalis*), were recorded nesting in Hoop Pines. Observations of behaviour associated with breeding included: (1) four courts of male Tooth-billed Bowerbirds on the rainforest edge, three in the National Park and one in the remnant; (2) a mature male Victoria's Riflebird *Ptiloris victoriae* displaying on dead trees emergent above the canopy and on a fencepost near the remnant; and (3) a pair of Grey Goshawks *T. novaehollandiae*, and a pair of Brown Goshawks performing mutual flying displays (Marchant & Higgins 1993) on the rainforest edge.

A female Victoria's Riflebird was seen drinking nectar from flowers of *Banksia plagiocarpa* (de Geest 2019). In the house garden a Spotted Catbird was observed feeding a fledgling with fallen papaw *Carica papaya* fruit, which was eaten on the tree by many honeyeaters, Satin Bowerbirds, Victoria's Riflebirds (including

fully-coloured males), and a Buff-banded Rail *Gallirallus philippensis*. Pacific Emerald Doves *Chalcophaps longirostris* were seen feeding (in trees) on seeds of papaw and Little Euodia *Melicope rubra*. Nestling Lewin's Honeyeaters were seen being taken by Pied Currawongs *Strepera graculina*, which were also regularly observed breeding. Prey taken by Brown Goshawks included a Barred Cuckoo-shrike *Coracina lineata* and a Spotted Nightjar *Eurostopodus argus* in the home paddock, and rodents *Melomys spp*. in the plantation. Grey Goshawks took adult and sub-adult Australian Brushturkeys in the home paddock and remnant, and a Northern Brown Bandicoot *Isoodon macrourus* in the plantation. Australian King Parrots *Alisterus scapularis minor* were observed feeding on the flower buds and unripe seeds of Tinaroo Glycine *Neonotonia wightii* (a pasture legume climbing on Hoop Pine). Brown Gerygones and Eastern Whipbirds were the only rainforest species recorded foraging in the plantation.

Discussion

Rainforest birds at the study site were largely typical of intact rainforest in the vicinity (Warburton 1987, 1997), and included terrestrial insectivores, edge-averse species, and birds able to disperse seeds of large fruits. Except for Satin Bowerbird, all were present from Stage 1. This indicates that a significant rainforest avifauna was well-established in recovering rainforest in the National Park, and to some extent in regrowth on the property, by 1988. Habitat for rainforest birds improved over time with the removal of grazing from vegetated areas and the growth of planted rainforest (Goosem & Tucker 2013). Revegetation both increased the area of rainforest and improved connectivity between small remnants, which presumably contributed to increased reporting rates for 13 rainforest-dependent species, some of which were recorded breeding in this study. Displays by a male Victoria's Riflebird, and parental feeding of a fledgling Spotted Catbird, were probably within the core areas of their home ranges (Frith & Frith 2001; Grant & Litchfield 2003).

The rainforest avifauna of the study site was similar to that of three disturbed sites at Lake Eacham within the National Park, surveyed over five years by Scambler & Burchill (2023), but the more open environment compared with more closed forest within the National Park presumably explains the higher reporting rates of canopy-feeding species, such as Grey Goshawk and some fruit pigeons, in this study. Local seasonal movements of frugivores in search of their preferred fruiting plants are not well-documented (Crome 1975; Higgins & Davies 1996; Higgins 1999), and this study adds to the findings of Scambler & Burchill (2023) on seasonal movements of frugivores. Scambler & Burchill (2023) found records of Australasian Figbird *Sphecotheres vieilloti* to be very strongly concentrated in the Dry Season, with almost no records in the Cool season, while in this study, the Dry Season peak was less prominent and the species was present in 75% of Cool season lists. Conversely, the Dry season peak in records of Double-eyed Fig-Parrot *Cyclopsitta diophthalma macleayana* was more pronounced in this study than found by Scambler & Burchill (2023), and – contrary to their findings of a Dry season peak within the National Park – records of White-headed Pigeon in this study were strongly concentrated in the Wet season. Additional data on the distribution and fruiting phenology of the preferred food plants of these species are needed to better understand their movements. Nocturnal surveys in the area are rare. Reporting rates for the Australian Boobook *Ninox boobook lurida* (83–94% of monthly lists; stable) and the endemic Lesser Sooty Owl *Tyto multipunctata* (65–88% of lists; increasing) confirm them as common residents at Lake Eacham.

The findings of this study provide an 18-year baseline with which to compare the avifauna of the Lakes Corridor and nearby revegetation in the future, including a new project funded by the regional natural resource management body Terrain (2025) to replant ~3 ha of rainforest adjoining the National Park, on a site formerly occupied by (exotic) Caribbean Pine *Pinus caribaea* (south of the property, see Plate 1). Rainforest-dependent birds found commonly in this study have increasingly utilised the Lakes Corridor since 2008, except for two endemics, the Bridled Honeyeater *Bolemoreus frenatus* (declining in mid-altitude rainforest) and Macleay's Honeyeater *Xanthotis macleayanus* (increasing in intact forest) (Stewart 2008; Jones 2016; Williams & de la Fuente 2021; A.N.D. Freeman, unpubl. data). Macleay's Honeyeater utilises disturbed sites and revegetation (Higgins *et al*. 2001; Jansen 2005; Freeman *et al.* 2009), but has decreased in regrowth 11 km north-east of the study site (Kowalski *et al.* 2022). There is only one record from the Lakes Corridor, in a small roadside remnant (Stewart 2008). The endemic Fernwren *Oreoscopus gutturalis* is common at Lake Barrine but is only occasionally recorded at Lake Eacham, >1 km from the Lakes Corridor (eBird 2024; pers.

obs.). Its ecology and pre-clearing distribution are poorly-known (Grant 2022; J.D.A. Grant pers. comm.), and its ability to colonise replanted sites is uncertain.

The endemic Chowchilla was recorded ~170 m south of the Lakes Corridor in this study, and has been heard calling in regrowth at the northern end of the Lakes Corridor near the Lake Barrine rainforest (A. and M. McCaffrey pers. comm.). Scambler & Burchill (2023) found no significant annual or seasonal variation in frequency of Chowchillas, while in this study, they were more often recorded in the Wet season, and more frequently over time. Chowchillas are far more common at Lake Barrine, where they occupy both wet (creek) gullies and dry gullies, than at Lake Eacham, where they only occupy wet gullies (Neumann 2002; eBird 2024). Chowchillas in this study were mostly detected by calls, which can be heard over 200–500 m, depending on terrain (Neumann 2002; A. McCaffrey, pers. comm.). They live in groups, and call for only ~2% of the day, in a loud chorus at dawn – whether other groups are present or not – and in occasional daytime territorial interactions with neighbours (Jansen 1993; Koetz-Trowse *et al*. 2012). Daytime calling at the study site (pers. obs.) implies the presence of more than one group – intriguingly, more so during the Wet season, when they usually call less often (Jansen 1993). This suggests that the emergence of temporary springs after heavy rain enables Chowchillas at Lake Eacham to use parts of their home range in the Wet season, that may be 'dry gullies' (so less-frequented) in other seasons. Although not edge-averse, Chowchillas are poor fliers (Higgins & Peter 2002; Freeman *et al*. 2015) and as the road separates them from the southern end of the Lakes Corridor, they may be more likely to populate the corridor from regrowth in the north.

It is concerning that a number of species with increased or stable reporting rates during this study have now declined both in mid-altitude rainforest, and in one large regrowth site (Williams & de la Fuente 2021; Kowalski *et al*. 2022). Declining species include the endemic Bridled Honeyeater, of which up to 15 individuals were recorded in surveys in the home paddock in 1993 (ECS unpublished data). Of the two rainforest-dependent species with a decreased reporting rate at the study site, the Tooth-billed Bowerbird is classed as Near Threatened because of a significant long-term decline in numbers, due to the effects of climate change (Garnett & Baker 2021; Williams & de la Fuente 2021). However, the extent of the decline may have been exacerbated in the medium term by the impacts of tropical cyclones: T.C. Larry in 2006, and Severe T.C. Yasi in 2011. The latter was the most widespread and damaging cyclone in the Wet Tropics since 1918 (Turton 2012; BirdLife International 2022), but was far less damaging at the study site than T.C. Larry. In 2006, at the study site and elsewhere, calling by males at courts began later than usual, presumably due to direct cyclonic impacts on courts and the shortage of rainforest fruits (Freeman & Vinson 2008), and at some Atherton Tablelands sites, the number of courts in use has only recently returned to pre-2006 levels (J.A.D. Grant unpubl. data). The decreased reporting rate for Pied Monarch resulted from fewer sightings in Stage 2, but records increased in Stage 3 (albeit not to Stage 1 levels), and the reporting rate over 18 years was 10%, similar to surveys in 1993–1998 (Scambler & Burchill 2023). This species is not considered at risk (Garnett & Baker 2021), and its reporting rate has increased in secondary rainforest ~11 km from the study site (Kowalski *et al*. 2022).

Acknowledgments

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Supplementary files

These are provided as worksheets within a single Microsoft Excel data file, available from https://birdsqueensland.org.au/sunbird_issues/articles/Vol_52/Scambler_2025_v52_1_24-34_supplementary.xlsx.

Appendix S1.   Number of species recorded in each month, 1992–2009.

Appendix S2.   Species not used in analysis (recorded in <10 monthly lists, 1992–2009).

Appendix S3.   Functional categories used in analysis.

Appendix S4.   Number of records (n=16260) of 125 bird species by rainforest dependency class recorded in monthly lists, 1992–2009.

Appendix S5.   Species with a significant increase in reporting rates in monthly lists, 1992–2009.

Appendix S6.   Species with a significant decrease in reporting rates in monthly lists, 1992–2009.

Appendix S7.   Species with no significant change in reporting rates in monthly lists, 1992–2009.

Adult female and juvenile male Chowchilla, July 2022, Lake Barrine on Atherton Tableland, Far North Qld
(Vince Bugeja)