Changes to the status of birds in the Tapitallee region on the south coast of New South Wales from 1928 to 2020

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ABSTRACT

Aubrey Elliott (1910-1943), a passionate 'bird-man', lived in the suburb of Tapitallee on the south coast of New South Wales until 1940. During that period he and his brother, Arthur kept notes on the birds in the local area and devised a hide that was mounted on a utility that enabled them to take close-up photographs. To augment his observations Elliott interviewed local residents and collated information on the status of the area's birds. In 1985 I purchased the property next to where Elliott lived and was given access to his notes. This paper presents a comparison of avifauna in the Tapitallee area between 1926-40 and 1985-2020. During that time there have been changes in the distribution and abundance of many birds. Fourteen species have become locally extinct while 28 have colonised/recolonised the area. Combining Aubrey's and our data a total of 194 species of bird have been recorded in the area. Dams have been constructed and native vegetation has regrown on the steeper slopes. These actions have expanded the habitat for aquatic and forest dependant species but disadvantaged those that occupy grasslands. The Red Fox *Vulpes vulpes* colonised the area in 1907 and is implicated in the local extinction of the Bush Stone Curlew *Burhinus grallarius*. Wildfire in January 2020 burnt a relatively small portion of the Tapitallee area but these fires burnt an extensive area of southern NSW and Victoria. These fires were likely to be responsible for the decline in the numbers of Yellow-faced Honeyeaters *Caligavis chrysops* and White-naped Honeyeater *Melithreptus lunatus* migrating north in the autumn of that year.

Key words: Bird, Tapitallee, long-term study, Elliott, climate change, clearing native vegetation, fire.

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Introduction

The critical value of long-term field studies and datasets is that it provides information to enhance our understanding of ecological changes and state of the environment (see Lunney, Dickman and Predavec 2018; Recher 2004; Barrett *et al.* 2007; Burgin and Saunders 2007; Llewellyn 2015). It is rare to have detailed historic data on any vertebrate group from a particular area. In the late 1980s I took interest in Elliott's notes, which were cited in the *Handbook of Birds in New South Wales* (Morris, McGill and Holmes 1981) and *The Birds of the County of Camden* (Gibson 1989). In 2003 Chris Chafer, a member of the Illawarra Bird Observers Club, provided access to Elliott's notes. The records were kept on cards within a metal filing box.

The notes referred to birds around Cambewarra (Tapitallee was originally within the suburb of Cambewarra).

Aubrey Elliott initially lived at the *Old home* till 1932 then moved about one kilometre south to a new property, *Milburn*. In 1940 Aubrey moved to Fernbrook (outside Dorrigo) to continue dairying but died shortly after he fell from a tree. Both Aubrey and his brother Arthur were bird photographers. Unfortunately searches for images (glass negatives) taken by Elliott and his brother have been unsuccessful. The new owner of *Milburn* stated that an outbuilding was Elliott's developing studio and when he purchased the property it was filled with glass negatives. He said that since no one wanted the photographs they were taken to the tip!

This review of the Tapitallee birds is based on Elliott's and my observations, augmented with data from other bird watchers. A surviving relative provided the locations for place names used by Elliott in his notes.

Methods

Study Area

The Tapitallee area (2 - 600 m AHD) is located on the south coast of New South Wales (NSW), some 200 km south of Sydney 35°05' latitude and 150°41' longitude (Figures 1-3) in the Shoalhaven local government area. I define the study area as the land from Red Rock (a portion of Cambewarra NR) in the north to the Shoalhaven River to the south, Riversdale (managed by Bundanon Trust) to the south-west and Bangalee-Tapitallee Roads in the east. It includes the catchments of Bengalee and Tapitallee Creeks, which originate on Emery's plateau. This area is the southern limit of the

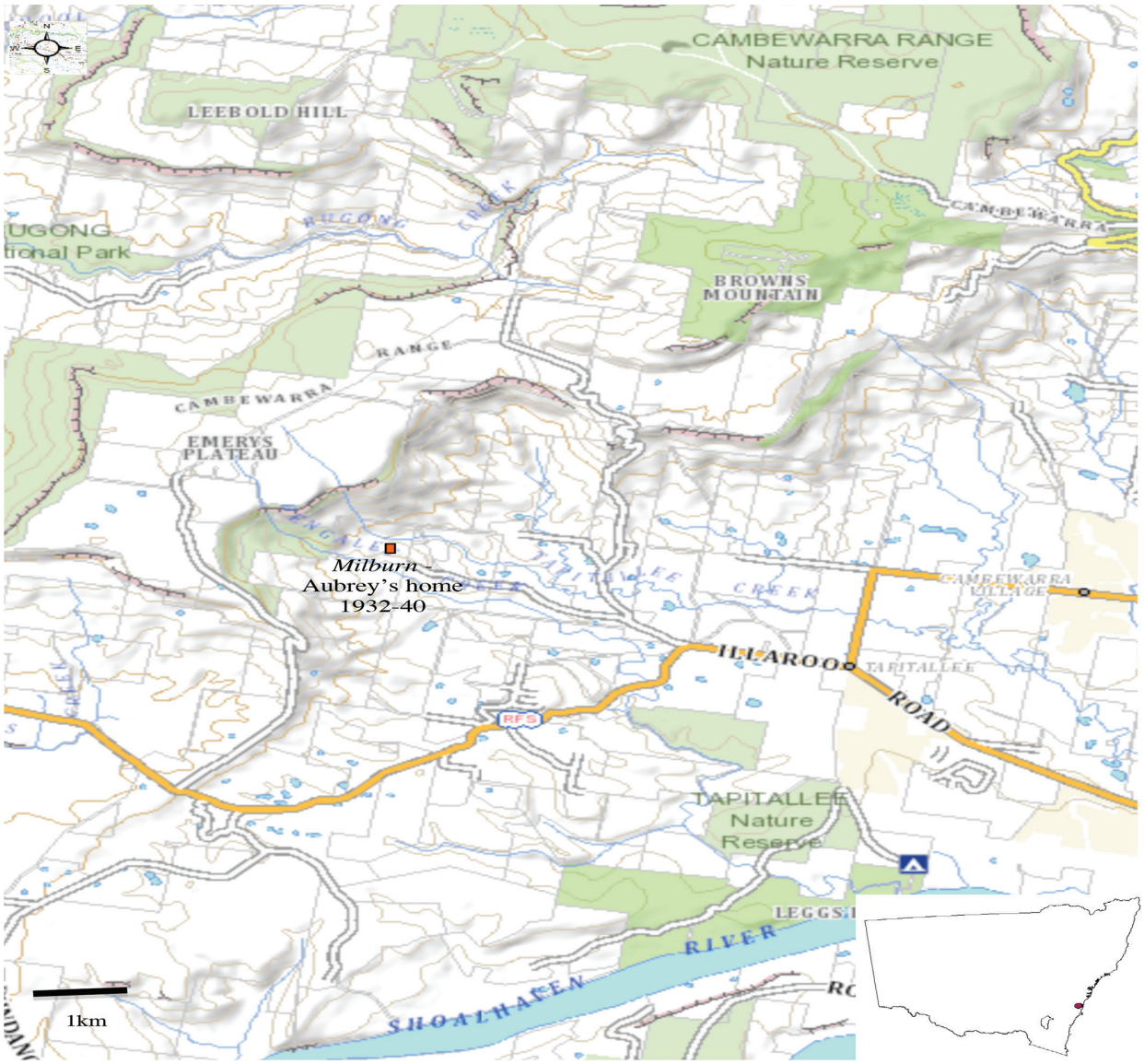

Figure 1. Location of the Tapitallee study area

Illawarra, an area that includes the coastal escarpment and plain from the Shoalhaven River north to Stanwell Park. The Tapitallee area totals some 4,000ha and includes two portions of Cambewarra Range Nature Reserve (NR) that total some 1,118ha. These are referred to here as Red Rocks (1,023ha) and Tapitallee Reserve (95ha) to distinguish the two parcels of habitat. The survey area includes Bangalee Reserve (130ha).

The area has a temperate climate with an average rainfall of c.1133 mm/year. However, since 2000 the average rainfall has fallen to c. 872mm/year (see Nowra RAN Stations 068072 and 068076). Average minimum and maximum air temperatures are 18 and 24° C for January (summer) and 9.5 and 15° C for July (winter) (Bureau of Meteorology 2007).

The vegetation communities in the area have been classified by OEH (2013) and the associated SR numbers are provided to align with their detailed descriptions (Table 1). They include: Lilly Pilly – Sassafras – Stinging Tree subtropical rainforest (SR568), Grey Myrtle - Lilly Pilly dry rainforest (SR551), Lilly Pilly - Coachwood warm temperate rainforest (SR567), Sydney Blue Gum x Bangalay - Lilly Pilly moist forest in gullies (SR652), Brown Barrel – Mountain Grey Gum tall forests on volcanic soils (SR526), Turpentine - Red Bloodwood - Sydney Peppermint open forest (SR658), Spotted Gum - Blackbutt shrubby open forest on the coastal foothills (SR641), Red Bloodwood - Blackbutt - Spotted Gum shrubby open forest (SR592), Red Bloodwood - Grey Gum shrubby forest (SR593), Red Bloodwood - Hard-leaved Scribbly Gum - Silvertop Ash heathy open forest on sandstone (SR594), Prickly Tea-tree - sedge wet heath on sandstone plateau, central and southern Sydney Basin (SR591) and River Oak Open Forest (SR606) (Daly 2018 a and b). Figure 4 shows the approximately location of the main vegetation communities.

The geology of the area is varied. In the north, the strata exposed on Red Rocks is Hawkesbury sandstone (Paix 1968). Forming the highest elevation of land in the study

Figure 2. Place names used by Aubrey Elliott in his notes - red square is pretty fig *Ficus superba*

Figure 3. Place names used by Elliott in the notes. These relate to where he lived until 1932.

Figure 4. Broad vegetation communities in the study area.

Table 1. Vegetation associations within the Tapitallee area as defined by the Office and Environment and Heritage (2013)

Community Name	SR code
Lilly Pilly – Sassafras – Stinging Tree subtropical rainforest	551
Lilly Pilly - Coachwood warm temperate rainforest	652
Brown Barrel – Mountain Grey Gum tall forests on volcanic soils	526
Turpentine - Red Bloodwood - Sydney Peppermint open forest	658
Spotted Gum - Blackbutt shrubby open forest on the coastal foothills	641
Red Bloodwood - Blackbutt - Spotted Gum shrubby open forest	592
Red Bloodwood - Hard-leaved Scribbly Gum - Silvertop Ash heathy open forest on sandstone	594
Prickly Tea-tree - sedge wet heath on sandstone plateau, central and southern Sydney Basin	591
River Oak Open Forest	606

area this is the southern-most remnant of this geologic unit. Hawkesbury sandstone overlays Budgong Sandstone and these two geologic units form the bulk of the Illawarra escarpment, which is the dominant geological feature from Tapitallee north to Stanwell Park.

The sandstone along the Shoalhaven River west to the Hampton bridge in Kangaroo Valley and encompassing most of Bangalee Reserve, Tapitallee Nature Reserve, Riversdale, Bundanon and Bugong National Park, is Nowra sandstone (Hazelton 1993). Between the Budgong and Nowra sandstones, the rolling hills are Cambewarra latites, which form deep and fertile soil (Hazelton 1993). The steep slopes, below the escarpment, have brown podzolic soils and large sandstone floaters that have fallen from the escarpment.

The geology and resulting soils dictates vegetation associations. In general deep, higher nutrient soils support rainforest and tall open forest while shallow soils on sandstone support heath and woodland. Geology influences the associated vegetation and hence the birds that use particular habitat.

My verandah (100m ADH) provides a commanding view over the headwaters of Tapitallee Creek and the forest along the escarpment. To encourage avifauna I have planted nectar producing native plants such as Swamp Banksia *Banksia robur*, Old Man Banksia *B. serrata* and Coastal Banksia *B. integrifolia* near the house and allowed native vegetation to recolonise the slopes. The broader landscape circa 10 ha has been planted with a mixture of endemic and north coast / wet tropics rainforest and eucalypt species. The aim of these plantings is to provide fauna with winter flowering eucalypts and fruit over the year. The remaining 30 ha of native vegetation is covered under a voluntary conservation agreement. The majority of my observations were taken from this land.

Survey Methods used by Elliott

Elliott's notes indicate he would milk in the morning and then take the cans down to a stand at the intersection of Browns Mountain Road and Flannery Lane. This left the rest of the day to do other farm chores and to observe and photograph birds. He recorded on his cards the distribution of each species in the Shoalhaven local government area, with additional observations by other people and if specimens were lodged in the Australian Museum. Elliott recorded the dates for nesting and the arrival and departure of migratory species. Elliott used colloquial terms to describe many locations where he saw birds (see Figures 2 and 3).

Survey Methods used by author

Bird surveys consisted of opportunistic observations, call playback for large forest owls and thirty-eight, 20 min surveys conducted at seventeen sites. The majority of the systematic surveys (79%) were conducted during spring and summer (30 of the 38 surveys) when seasonal migratory species were present, while four surveys were conducted in autumn and four in winter. The systematic surveys followed the methods devised by the NPWS southern Comprehensive Regional Assessment (CRA) unit (NPWS 1999). Detection was based primarily on recognition of species-specific calls and also by visual encounters. The systematic surveys were conducted by C. Gosper, M. Smith, K. Touzal and the author. Mr Gosper conducted four surveys in 1998 and the other 34 surveys were conducted between 2017-2020.

The number of each species was recorded along with the detection method (heard or seen). This provided a count of species richness, abundance (total detected) and frequency of detection (cumulative presence per surveys) for the systematic surveys. If birds were heard and then seen they were recorded as seen as this is considered a more accurate method of detection. Other information collected included the surveyors name, location of the survey site (either using a GPS or SIX maps), date, cloud cover, wind speed (0-5), rain and flowering trees.

The majority of records were opportunistic detections between 1985 and 2020. These were made on most days on my property and environs. These detections provided data on altitudinal and migratory species over the seasons. In addition to systematic and opportunistic detections I reviewed data collected by D. Wright from 1984-1990 (kept on cards) and unpublished information from residents and experienced bird watchers including R. Ashford, G. McDonald, L. Mitchell, M. Murphy, M. Smith, K. Touzal and B. Virtue.

RESULTS

Bird Species

One hundred and ninety four species of bird have been recorded in the Tapitallee area (Table 2). Of this total Elliott detected 153 species and I recorded 174 species. Elliott recorded 18 species from 1926 to 1940 that were not detected between 1985 and 2020. Conversely I found 35 species not recorded by Elliott, although some of these are single observations of vagrant species. A few species were not detected by either person but are listed in the Elliott notes as being historically present being accounts from other people. The Tapitallee area has about 64% of the total species (excluding pelagic birds) recorded for the Shoalhaven local government area.

Birds recorded in the area during thirty-eight 20 min surveys undertaken from 1998 to 2020 are presented in Table 3. The number of species detected range from 11 to 30 per census (average 19 species). The three most abundant (total detections) species found were the Silvereye *Zosterops lateralis* (c.8% of total birds), Brown Gerygone *Gerygone mouki* (c.7% of total birds) and Lewins Honeyeater *Meliphaga lewinii* (c.6% of total birds) accounting for about 21% of the total number detected. Eleven species were only recorded once during

Table 2. Status of bird species recorded in the Tapitallee area, NSW from 1926 to 2020.
Note: Locally extinct is when a species has not been detected for 25 years. * indicated introduced species.

Common Name	Scientific Name	1926-40	1985-2020	Status
Australian Brush-turkey	*Alectura lathami*	Not detected	Nesting 2020	Increasing
Brown Quail	*Coturnix ypsilophora*	Seldom seen in bracken	Emery's plateau in grassy paddocks	Unchanged
Stubble Quail	*Coturnix pectoralis*	Seldom seen	Not detected	Decreasing
Black Swan	*Cygnus atratus*	Seen flying overhead once at dusk	Seen flying overhead twice at dusk	Unchanged
Australian Wood Duck	*Chenonetta jubata*	Not detected	Common beside dams and paddocks	Increasing
Black Duck	*Anas superciliosa*	Uncommon	Common on dams	Increasing
Chestnut Teal	*Anas castanea*	Not detected	Uncommon dams	Unchanged
Australian Grebe	*Tachybaptus novaehollandiae*	One detection	Rare see on large dam	Unchanged
Darter	*Anhinga melanogaster*	Not detected	Uncommon, Shoalhaven River & dams	Increasing
Little Pied Cormorant	*Microcarbo melanoleucos*	Unknown if seen in area	Uncommon, dams & Shoalhaven River	Increasing
Pied Cormorant	*Phalacrocorax varius*	Unknown if seen in area	Uncommon beside the Shoalhaven River	Increasing
Little Black Cormorant	*Phalacrocorax sulcirostris*	Not detected in area	Uncommon, Shoalhaven River & dams	Increasing
Great Cormorant	*Phalacrocorax carbo*	Not detected	Along the Shoalhaven River	Increasing
White-faced Heron	*Egretta novaehollandiae*	Uncommon	Common beside dams	Increasing
White-necked Heron	*Ardea pacifica*	Rare	Uncommon beside dams	Increasing
Great Egret	*Ardea alba*	Uncommon	Uncommon beside dams	Unchanged
Intermediate Egret	*Ardea intermedia*	Not detected	Uncommon beside dams	Increasing
Cattle Egret	*Ardea ibis*	Not detected	Common in summer	Increasing
Nankeen Night Heron	*Nycticorax coledonicus*	Rare	Rare beside dams	Unchanged
Black Bittern	*Ixobrychus flavicollis*	Rare	Rare, one record Bengalee Ck	Unchanged
Straw-necked Ibis	*Threskiornis spinicollis*	Rare	Common 2019 and 2020 paddocks	Increasing
Black-shouldered Kite	*Elanus axillaris*	Rare	Uncommon	Increasing
Square-tailed Kite	*Lophoictinia isura*	Not detected	Rare, nested Bangalee Reserve	Increasing
Whistling Kite	*Haliastur sphenurus*	Rare	Uncommon along the Shoalhaven River	Unchanged
White-bellied Sea-eagle	*Haliaeetus leucogaster*	Rare	Common along the Shoalhaven River	Increasing
Pacific Baza	*Nisaetus cirrhatus*	Not detected	Seen in 2019 and 2020	Increasing
Brown Goshawk	*Accipiter fasciatus*	Common breeding	Common breeding	Unchanged
Grey Goshawk	*Accipiter novaehollandiae*	Uncommon breeding	Common breeding	Increasing
Collared Sparrowhawk	*Accipiter cirrhocephalus*	Uncommon breeding	Uncommon	Unchanged
Wedge-tailed Eagle	*Aquila audax*	Uncommon breeding	Common breeding	Increasing
Little Eagle	*Hieraaetus morphnoides*	Rare, few birds	Rare, one record	Unchanged
Peregrine Falcon	*Falco peregrinus*	Uncommon	Uncommon, breeds at Bugong	Unchanged
Nankeen Kestrel	*Falco cenchroides*	Common	Common	Unchanged
Lewin's Rail	*Rallus pectoralis*	Not detected	Rare	Unchanged

Common Name	Scientific Name	1926-40	1985-2020	Status
Purple Swamphen	*Porphyrio porphyrio*	Common	Common, breeding	Unchanged
Dusky Moorhen	*Gallinula tenebrosa*	Not detected	Uncommon	Increasing
Eurasian Coot	*Fulica atra*	Common	Common	Unchanged
Painted Button-quail	*Turnix varia*	Not seen in area	Infrequent and sporadic	Increasing
Latham's Snipe	*Gallingo hardwickii*	Rare	Not detected	Unchanged
Bush-stone Curlew	*Burhinus grallarius*	Historically present	Not detected	Locally Extinct
Black-winged Stilt	*Himantopus himantopus*	No recorded	One sighting of 3 birds	Unchanged
Masked Lapwing	*Vanellus miles*	Rare	Common, breeding	Increasing
Silver Gull	*Larus novaehollandiae*	Not seen in area	Common along the Shoalhaven River	Increasing
Crested Tern	*Sterna bergii*	Not seen in area	Uncommon along the Shoalhaven River	Unchanged
White-headed Pigeon	*Columba leucomela*	Not detected but shot if seen	Common	Increasing
Spotted Turtle-dove*	*Streptopelia chinensis*	First seen in 1930	Not detected	Decreasing
Brown Cuckoo-dove	*Macropygia amboinensis*	Historically seen in area	Common	Increasing
Emerald Dove	*Chalcophaps indica*	Fairly common	Rare, four observations	Decreasing
Common Bronzewing	*Phaps chalcoptera*	Common	Common	Unchanged
Brush Bronzewing	*Phaps elegans*	Not seen in area	Two animals seen	Increasing
Crested Pigeon	*Ocyphaps lophotes*	Not seen in area	Uncommon	Increasing
Peaceful Dove	*Geopelia striata*	Fairly common	Rare	Decreasing
Bar-shouldered Dove	*Geopelia humeralis*	Not seen in area	Rare	Increasing
Wonga Pigeon	*Leucosarcia melanoleuca*	Common	Common	Unchanged
Wompoo Pigeon	*Ptilinopus magnificus*	Locally extinct	Locally extinct	Locally Extinct
Superb Fruit-dove	*Ptilinopus superbus*	Historic record	Window killed bird plus one calling	Unchanged
Topnot Pigeon	*Lopholaimus antarcticus*	Regularly observed but shot	Regularly observed	Increasing
Glossy Black Cockatoo	*Calyptorhynchus lathami*	Rare	Uncommon	Increasing
Yellow-tailed Black-cockatoo	*Calyptorhynchus funereus*	Common	Common	Unchanged
Gang-gang Cockatoo	*Callocephalon fimbriatum*	Common	Uncommon	Decreasing
Galah	*Eolophus roseicapillus*	Uncommon	Common	Increasing
Long-billed Corella	*Cacatua tenuirostris*	Not recorded	Uncommon	Increasing
Little Corella	*Cacatua sanguinea*	Not recorded	Common	Increasing
Sulphur-crested Cockatoo	*Cacatua galerita*	Uncommon	Common	Increasing
Rainbow Lorikeet	*Trichoglossus haematodus*	Uncommon	Abundant	Increasing
Musk Lorikeet	*Glossopsitta concinna*	Common	Uncommon	Decreasing
Little Lorikeet	*Glossopsitta pusilla*	Common	Uncommon	Decreasing
Australian King-Parrot	*Alisterus scapularis*	Not recorded in area	Common	Increasing
Crimson Rosella	*Platycercus elegans*	Common	Common	Unchanged
Eastern Rosella	*Platycercus eximius*	Common	Common	Unchanged
Pallid Cuckoo	*Cuculus pallidus*	Rare	Not detected	Decreasing
Brush Cuckoo	*Cacomantis variolosus*	Uncommon	Common	Increasing
Fan-tailed Cuckoo	*Cacomantis flabelliformis*	Common	Common	Unchanged
Horsfield's Bronze Cuckoo	*Chrysococcys basalis*	Common	Common	Unchanged
Shining Bronze Cuckoo	*Chrysococcys lucidus*	Common	Common	Unchanged

Common Name	Scientific Name	1926-40	1985-2020	Status
Black-eared Cuckoo	*Chrysococcys osculans*	Feb. and Dec. 1926 & Nov-Dec 1927	Not detected	Locally Extinct
Eastern Koel	*Eudynamys orientalis*	Rare	Common	Increasing
Channel-billed Cuckoo	*Scythrops novaehollandiae*	Not recorded	Common	Increasing
Powerful Owl	*Ninox strenua*	Rare	Rare	Unchanged
Barking Owl	*Ninox connivens*	Rare, one observation	Few calls heard in the1990s	Locally Extinct
Southern Boobook	*Ninox novaeseelandiae*	Common	Common	Unchanged
Sooty Owl	*Tyto tenebricosa*	Rare	Frequently heard	Unchanged
Masked Owl	*Tyto novaehollandiae*	Common	Rare	Decreasing
Barn Owl	*Tyto alba*	Rare	Rare	Unchanged
Tawny Frogmouth	*Podargus strigoides*	Common	Common	Unchanged
White-throated Nightjar	*Eurostopodus mystacalis*	Uncommon	Uncommon, woodlands	Unchanged
Owlet Nightjar	*Aegotheles cristatus*	Rare	Common	Increasing
White-throated Needletail	*Hirundapus caudacutus*	One sighting of a flock	Regular late summer migrant	Increasing
Fork-tailed Swift	*Apus pacificicus*	One sighting of a flock	Not seen	Unchanged
Azure Kingfisher	*Alcedo azurea*	Common	Uncommon	Unchanged
Laughing Kookaburra	*Dacelo novaeguineae*	Uncommon	Common	Increasing
Sacred Kingfisher	*Todiramphus sanctus*	Common	Common	Unchanged
Rainbow Bee-eater	*Merops ornatus*	Uncommon	Uncommon, nests beside Shoalhaven R	Unchanged
Dollarbird	*Eurystomus orientalis*	Not recorded	Common	Increasing
Noisy Pitta	*Pitta versicolor*	Not detected	Few detections	Increasing
Superb Lyrebird	*Menura novaehollandiae*	Common	Common	Unchanged
White-throated Treecreeper	*Cormobates leucophaea*	Common	Common	Unchanged
Red-browed Treecreeper	*Climacteris erythrops*	Rare	Not detected	Locally Extinct
Superb Fairy-wren	*Malurus cyaneus*	Common, breeding	Common, breeding	Unchanged
Variegated Fairy-wren	*Malurus lamberti*	Common, breeding	Uncommon, breeding	Decreasing
Southern Emu Wren	*Stipiturus malachurus*	Rare, only found at Red Rock	Rare, only found at Red Rock	Unchanged
Spotted Pardalote	*Pardalotus punctatus*	Common, breeding	Common, breeding	Unchanged
Striated Pardalote	*Pardalotus striatus*	Common	Uncommon	Decreasing
Eastern Bristlebird	*Dasyornis brachypterus*	Rare, seen after 1929 fire	Rare, only found at Red Rock	Unchanged
Pilotbird	*Pycnoptilus floccosus*	Not recorded	Rare, one record Red Rock	Unchanged
Rock Warbler	*Origma solitaria*	Common, breeding	Common, along Shoalhaven River	Unchanged
Yellow-throated Scrubwren	*Sericornis citreogularis*	Common, breeding	Common, breeding	Unchanged
White-browed Scrubwren	*Sericornis frontalis*	Common, breeding	Common, breeding	Unchanged
Large-billed Scrubwren	*Sericornis magnirostris*	Common, breeding	Uncommon	Decreasing
Brown Gerygone	*Gerygone mouki*	Common, breeding	Common, breeding	Unchanged
White-throated Gerygone	*Gerygone olivacea*	Not recorded	Uncommon	Increasing
Brown Thornbill	*Acanthiza pusilla*	Common, breeding	Common, breeding	Unchanged
Buff-rumped Thornbill	*Acanthiza reguloides*	Common, breeding	Rare	Decreasing
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*	Common, breeding	Rare	Decreasing

Common Name	Scientific Name	1926-40	1985-2020	Status
Yellow Thornbill	*Acanthiza nana*	Not recorded	Common, Bangalee Reserve	Increasing
Striated Thornbill	*Acanthiza lineata*	Common, breeding	Common, breeding	Unchanged
Red Wattlebird	*Anthochaera carunculata*	Common	Common	Unchanged
Little Wattlebird	*Anthochaera chrysoptera*	Not detected in area	Common	Increasing
Noisy Friarbird	*Philemon corniculatus*	Common	Common, breeding	Unchanged
Regent Honeyeater	*Xanthomyza phrygia*	At times common	Not detected	Locally Extinct
Noisy Miner	*Manorina melanocephala*	Common, breeding	Common, breeding	Decreasing
Bell Miner	*Manorina melanophrys*	Not recorded	Rare one record post 2020 fire	Unchanged
Lewin's Honeyeater	*Meliphaga lewinii*	Common, breeding	Common, breeding	Unchanged
Yellow-faced Honeyeater	*Caligavis chrysops*	Abundant	Abundant, breeding	Unchanged
White-eared Honeyeater	*Lichenostomus leucotis*	Not seen in area	Uncommon, woodlands	Unchanged
Yellow-tufted Honeyeater	*Lichenostomus melanops*	Not seen in area	Grey Gum forest – river escarpment	Unchanged
White-naped Honeyeater	*Melithreptus lunatus*	Common, breeding	Common, breeding	Unchanged
Brown-headed Honeyeater	*Melithreptus brevirostris*	Common, breeding	Rare	Decreasing
Crescent Honeyeater	*Phylidonyris pyrrhoptera*	Rare	Rare one spring pair inhabited valley	Unchanged
New Holland Honeyeater	*Phylidonyris novaehollandiae*	Common	Common, breeding	Unchanged
White-cheeked Honeyeater	*Phylidonyris niger*	Uncommon	Uncommon	Unchanged
Eastern Spinebill	*Acanthorhynchus tenuirostris*	Common, breeding	Common, breeding	Unchanged
Scarlet Honeyeater	*Myzomela sanguinolenta*	Uncommon	Common	Increasing
White fronted Chat	*Epthianura albifrons*	Rare, one pair seen	Not detected	Locally Extinct
Jacky Winter	*Microeca leucophaea*	Common	Uncommon	Decreasing
Scarlet Robin	*Petroica boodang*	Common	Rare	Decreasing
Rose Robin	*Petroica phoenicea*	Common	Common	Unchanged
Flame Robin	*Petroica rosea*	Uncommon	Not detected	Locally Extinct
Hooded Robin	*Melanodryas cucullata*	Rare, one record	Not detected	Locally Extinct
Eastern Yellow Robin	*Eopsaltria australis*	Common	Common	Unchanged
Southern Logrunner	*Orthonyx temminckii*	Rare	Uncommon	Increasing
Eastern Whipbird	*Psophodes olivaceus*	Common, breeding	Common, breeding	Unchanged
Varied Sittella	*Daphoenositta chrysoptera*	Insufficient information	Rare	Decreasing
Crested Shrike-tit	*Falcunculus frontatus*	Common, breeding	Common	Unchanged
Golden Whistler	*Pachycephala pectoralis*	Common, breeding	Common, breeding	Unchanged
Rufous Whistler	*Pachycephala rufiventris*	Common, breeding	Common, breeding	Unchanged
Olive Whistler	*Pachycephala olivacea*	No definite detection	Rare, Red Rock	Unchanged
Grey Shrike-thrush	*Colluricincla harmonica*	Common, breeding	Common, breeding	Unchanged
Black-faced Monarch	*Monarcha melanopsis*	Uncommon	Common	Increasing
Satin Flycatcher	*Monarcha cyanoleuca*	Not recorded	Rare	Unchanged
Leaden Flycatcher	*Myiagra rubecula*	Uncommon	Uncommon	Unchanged
Restless Flycatcher	*Myiagra inquieta*	Uncommon	Uncommon	Unchanged
Magpie Lark	*Grallina cyanoleuca*	Common, breeding	Common, breeding	Unchanged
Rufous Fantail	*Rhipidura rufifrons*	Common, breeding	Common, breeding	Unchanged
Grey Fantail	*Rhipidura albiscapa*	Common, breeding	Common, breeding	Unchanged

Common Name	Scientific Name	1926-40	1985-2020	Status
Willie Wagtail	*Rhipidura leucophrys*	Common, breeding	Common, breeding	Unchanged
Spangled Drongo	*Dicrurus bracteatus*	Rare	Not detected	Unchanged
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	Common, breeding	Common	Unchanged
White-bellied Cuckoo Shrike	*Coracina papuensis*	Rare	Not detected	Locally Extinct
Cicadabird	*Coracina tenuirostris*	Rare	Uncommon	Increasing
White-winged Triller	*Lalage sueurii*	Common, breeding	Rare, one sighting	Decreasing
Olive-backed Oriole	*Oriolus sagittatus*	Uncommon	Common	Increasing
Figbird	*Sphecotheres viridis*	No records	Rarely detected outside Nowra	Increasing
Masked Woodswallow	*Artamus personatus*	Rare	Not detected	Unchanged
Dusky Woodswallow	*Artamus cyanopterus*	Uncommon, breeding	Rarely seen	Decreasing
Grey Butcherbird	*Cracticus torquatus*	Common, breeding	Common, breeding	Unchanged
Australian Magpie	*Cracticus tibicen*	Common, breeding	Common	Unchanged
Pied Currawong	*Strepera graculina*	Common, breeding	Common	Unchanged
Grey Currawong	*Strepera visicolor*	Common at times	Not detected	Locally Extinct
Australian Raven	*Corvus coronoides*	No adequate information	Common, breeding	Unchanged
Little Raven	*Corvus mellori*	No information	Uncommon	Increasing
Torresian Crow	*Corvus orru*	No information	Rare, one detection	Unchanged
White-winged Chough	*Corcorax melanorhamphos*	Not detected in area	Uncommon	Increasing
Green Catbird	*Ailuroedus crassirostris*	Common, breeding	Common, breeding	Unchanged
Satin Bowerbird	*Ptilonorhynchus violaceus*	Common, breeding	Common, breeding	Unchanged
Richard's Pipit	*Anthus novaeseelandiae*	Common, breeding	Uncommon	Decreasing
House Sparrow*	*Passer domesticus*	First seen in 1939	Not detected, locally extinct	Locally Extinct
Double-barred Finch	*Taeniopygia bichenovii*	Not detected in area	Uncommon, one detection	Unchanged
Red-browed Firetail	*Neochmia temporalis*	Common, breeding	Common, breeding	Unchanged
Diamond Firetail	*Stagonopleura guttata*	Common, breeding	Not detected, locally extinct	Locally Extinct
Beautiful Firetail	*Stagonopleura bella*	Not recorded	Rare, one record Red Rocks	Unchanged
Mistletoebird	*Dicaeum hirundinaceum*	Common, breeding	Common	Unchanged
Welcome Swallow	*Hirundo neoxena*	Common, breeding	Common, breeding	Unchanged
Tree Martin	*Petrochelidon nigricans*	Uncommon	Uncommon	Unchanged
Fairy Martin	*Hirundo aeriel*	Common	Not recorded	Locally Extinct
Red-whiskered Bulbul*	*Pycnonotus jocosus*	Not recorded	Common	Increasing
Clamorous Reed Warbler	*Acrocepephalus stentoreus*	Common	Uncommon	Decreasing
Little Grassbird	*Megalurus gramineus*	Rare, one pair seen	Not detected	Unchanged
Brown Songlark	*Cincloramphus cruralis*	Rare, one bird seen	Not detected	Unchanged
Silvereye	*Zosterops lateralis*	Common, breeding	Common	Unchanged
Bassian Thrush	*Zoothera lunulata*	Common	Common, breeding	Unchanged
Common Blackbird*	*Turdus merula*	First seen in 1939	Occasional visitor	Increasing
Common Starling*	*Sturnus vulgaris*	Common	Uncommon	Decreasing
Common Myna*	*Sturnus tristis*	Not detected	Few detections	Increasing

Table 3. Relative abundance of birds detected during 38, 20min surveys undertaken from 1998 to 2020

Species	Total detected	Total number of times a species was detected over the 38 surveys
Silvereye	126	15
Brown Gerygone	112	23
Lewins Honeyeater	87	31
Eastern Whipbird	62	29
Eastern Spinebill	53	26
Brown Thornbill	52	20
Grey Fantail	49	25
Golden Whistler	46	29
Satin Bowerbird	46	28
Topknot Pigeon	41	6
White-browed Scrubwren	41	18
Pied Currawong	39	22
Eastern Yellow Robin	37	23
Laughing Kookaburra	35	23
Superb Fairywren	35	14
Superb Lyrebird	35	22
Spotted Pardalote	34	18
Wonga Pigeon	34	25
Yellow-faced Honeyeater	34	15
Crimson Rosella	33	21
Australian King Parrot	31	16
Striated Thornbill	30	9
Australian Magpie	29	22
Australian Raven	28	18
Brown Cuckoo Dove	26	19
Grey Butcherbird	24	19
Black-faced Monarch	22	15
Scarlet Honeyeater	20	12
Grey-shrike Thrush	18	16
Rufous Fantail	18	12
New Holland Honeyeater	17	5
White-throated Treecreeper	16	15
Yellow-tailed Black Cockatoo	15	7
Olive-backed Oriole	14	10
Green Catbird	12	7
Red Whiskered Bulbul	12	8
Rufous Whistler	10	5
Noisy Friarbird	9	6
Rainbow Lorikeet	9	3
Yellow-throated Scrubwren	9	5
Red Wattlebird	7	6
Yellow Thornbill	7	3
Brush Cuckoo	6	6
White-headed Pigeon	6	5
Channel-billed Cuckoo	5	4
Eastern Bristlebird	5	3
Variegated Fairy Wren	5	3
Welcome Swallow	5	4
Bassian Thrush	4	3
Fan-tailed Cuckoo	4	3
Galah	4	3
Sacred Kingfisher	4	3
Sulphur-crested Cockatoo	4	4
Black-faced Cuckoo Shrike	3	2
Common Bronzewing	3	3
Crested Shrike-tit	3	3
Eastern Koel	3	3
Gang-gang Cockatoo	3	2
Mistletoebird	3	2
Purple Swamphen	3	1
Reed Warbler	3	1
Rose Robin	3	3
Australian Magpie Lark	2	2
Brown Quail	2	1
Shining Bronze Cuckoo	2	2
Southern Emu Wren	2	1
Cicadabird	1	1
Collared Sparrowhawk	1	1
Dollarbird	1	1
Leaden Flycatcher	1	1
Little Wattlebird	1	1
Masked Lapwing	1	1
Pilotbird	1	1
Restless Flycatcher	1	1
White-cheeked Honeyeater	1	1
White-faced Heron	1	1
Willie Wagtail	1	1

systematic surveys. The four most frequently detected birds (presence per surveys) were the Lewins Honeyeater, Eastern Whipbird *Psophodes olivaceus,* Golden Whistler *Pachycephala pectoralis* and Satin Bowerbird *Ptilonorhynchus violaceus* were detected between 28-31 of the 38 surveys.

A number of species were highly associated with wet heath (SR591) and heathy open forest (SR594) at Red Rocks. These include the Eastern Bristlebird *Dasyornis brachypterus*, Olive Whistler *Pachycephala olivacea*, Southern Emu Wren *Stipiturus malachurus* and Pilotbird *Pycnoptilus floccosus*. These heath habitat specialists will utilise small, isolated patches of this floristically diverse vegetation.

Seasonal Migrants

Fifty species of birds (26% of the total recorded) are seasonal breeding migrants or are nomadic species that move to the area to access food resources. Some birds migrate from lower latitudes to breed in spring and summer, while others move from higher altitudes to the coastal ranges. Table 4 lists the species with approximate times of arrival and departure primarily based on Elliott's notes, unpublished data from D. Wright and R. Ashford and the author's observations.

Seasonal migrants such as the Yellow-faced Honeyeater *Caligavis chrysops*, Scarlet Honeyeater *Myzomela sanguinolenta*, White-naped Honeyeater *Melithreptus lunatus*, Silvereye, Noisy Friarbird *Philemon corniculatus* and Red Wattlebird *Anthochaera carunculata* are detected biannually as they move along the escarpment during their north and south bound migrations. Yellow-faced Honeyeater and White-naped Honeyeater form mixed flocks while the other species move in flocks of their own species. The planting of various flowering/fruiting trees and shrubs has provided a foraging stepping-stone for these birds. Most seasonal migrants arrive in spring but the Horsfield's Bronze Cuckoo, Shining Bronze Cuckoo, Tree Martin, Black-faced Cuckoo-shrike may arrive in late winter.

In late summer the Rose Robin *Petroica phoenicea* is present being a migrant from higher altitudes. In autumn flocks of dispersing juvenile Satin Bowerbird *Ptilonorhynchus violaceus* are abundant and Pied Currawong *Strepera graculina* flocks fly from the coastal plain to the escarpment each night to roost. Since there are also resident populations of these species they have not been included as migratory in Table 4.

Changes in Species Status

Some birds that occupy fragmented or open forest have declined while those that occupy forest have increased. Fifty-eight species (29%) increased, 24 species (13%) decreased and 98 species (50%) remaining unchanged. Fourteen species (8%) have not been detected for twenty-five years or more and appear to have become locally extinct (Table 2).

Species have declined for a number of reasons. Those that normally inhabit woodland and are nomadic, such as the Black-eared Cuckoo *Chrysococcys osculans*, Pallid Cuckoo *Cuculus pallidus*, Regent Honeyeater *Xanthomyza phrygi*, Jacky Winter *Microeca leucophaea*, Flame Robin *Petroica phoenicea*, Scarlet Robin *Petroica boodang*, Varied Sitella *Daphoenositta chrysoptera*, White-winger Triller *Lalage sueurii*, Dusky Woodswallow *Artamus cyanopterus* have been affected by removal and simplification of habitat over broad areas of the landscape (Barrett *et al.* 2007, Department of Environment 2016). Forty nine percent of native vegetation in NSW had been cleared by 2018 (NSW EPA 2019). Other species in decline, with more localised distributions, are those that prefer open forest such as the Peaceful Dove *Geopelia striata*, Buff-rumped Thornbill *Acanthiza reguloides*, Yellow-rumped Thornbill *Acanthiza chrysorrhoa* and Striated Pardalote *Pardalotus striatus*. These woodland species have declined probably as areas that were pasture in the 1930-40s are now tall open forest. The introduced Spotted Turtle Dove *Streptopelia chinensis* has also declined in abundance.

Some species that have increased in abundance are associated with tall open - closed forest and dams. These include waterbirds, rainforest pigeons and predatory birds. There are also a number of species that have colonised the region either naturally or from the liberation of caged birds.

Colonising species include the Australian Wood Duck *Chenonetta jubata*, Figbird *Sphecotheres vieilloti*, Bar-shouldered Dove *Geopelia humeralis*, Galah *Eolophus roseicapillus*, Sulfur-crested Cockatoo *Cacatua galerita*, Little Corella *Cacatua sanguinea,* Long-billed Corella *Cacatua tenuirostris*, Eastern Koel *Eudynamys orientalis*, Channel-billed Cuckoo *Scythrops novaehollandiae*, Dollarbird *Eurystomus orientalis*, Noisy Pitta *Pitta versicolor*, Cattle Egret *Bubulcus ibis*, White-winged Chough *Corcorax melanorhamphos,* Red Whiskered Bulbul *Pycnonotus jocosus*, Common Starling *Sturnus vulgaris*, Common Blackbird *Turdus merula* and Common Myna *Sturnus tristis*.

Some of these colonising birds have originated from escaped (liberated) caged animals. These include the Little Corella *Cacatua sanguinea* and Long-billed Corella *Cacatua tenuirostris*. Others are exotic species that have expanded their range from the areas where they were originally liberated. These include Red Whiskered Bulbul *Pycnonotus jocosus*, Common Starling *Sturnus vulgaris*, Common Blackbird *Turdus merula* and Common Myna *Sturnus tristis*.

The White-headed Pigeon *Columba leucomela*, Brown Cuckoo Dove *Macropygia amboinensis* and Australian King Parrot *Alisterus scapularis* have recovered in the absence of shooting and utilising the fruit of weeds (i.e. Wild Tobacco *Solanum mauritianum*) and exotic trees (Camphor laurel *Cinnamomum camphora*) that have become common in the area.

Other species were historically known from lower latitudes and have moved south, probably as a result of regrowth of previously cleared bush. These include Noisy Pitta *Pitta versicolor*, Eastern Koel *Eudynamys orientalis*, Channel-billed Cuckoo *Scythrops novaehollandiae* and Figbird *Sphecotheres vieilloti*. The Noisy Pitta is a rainforest specialist and the regrowth of this forest has provided additional habitat for the species, whereas the Figbird has a very narrow distribution along the coastal fringe, particularly in towns where figs have been planted. The expansion in the range of the Koel and Channel-billed Cuckoo is probably a result of their host species, the Red Wattlebird *Anthochaera carunculata* and Pied Currawong *Strepera graculina* becoming more abundant. Elliott provides information on the White-winged Chough occurring south-west of the Tapitallee area (Yerriyong and Nowra Hill) but did not record them in the area himself. It appears that this species has expanded its range as it now occurs in the area and further east near the coast (Culburra, G. Daly unpub. data).

Table 4. Arrival and departure times of migratory species in the Shoalhaven

Notes: dates are from various locations in the Shoalhaven. Individual birds may be detected outside of designated months. Data from A. Elliott, D. Wright (unpublished notes), personal observations and Morris *et. al.* 1981. * indicates migration from low latitudes for breeding.

It would be useful to add date ranges to this table if possible.

Species	Arrival	Departure
Rose-crowned Pigeon	December?	January
Pacific Baza*	December	January
Square-tailed Kite*	September	March
Latham's Snipe	October	February
Cattle Egret	March?	February
Little Lorikeet	Sporadic with flowering	Sporadic with flowering
Pallid Cuckoo*	September	December
Brush Cuckoo*	September	February
Fan-tailed Cuckoo*	August	April
Horsfield's Bronze Cuckoo*	July	February
Shining Bronze Cuckoo*	September	May
Eastern Koel*	September	February
Channel-billed Cuckoo*	September	February
White-throated Nightjar*	December	February
White-throated Needletail	January	March
Fork-tailed Swift	October	March
Sacred Kingfisher*	October	February
Rainbow Bee-eater*	October	March
Dollarbird*	October	February
Noisy Pitta	April	December
White-throated Gerygone*	September	March
Yellow-faced Honeyeater*	Aug-September move south	February-May move north
White-naped Honeyeater*	September move south	February-April move north
Brown-headed Honeyeater*	Aug-September move south	April-May move north
Crescent Honeyeater	July	October, Rare coastal visitor
Scarlet Honeyeater*	September	February-March
Scarlet Robin	July	March
Rose Robin	June	April
Flame Robin	October	May
Rufous Whistler*	September	March
Black-faced Monarch*	September	March
Satin Flycatcher*	September	February
Leaden Flycatcher*	October	February
Rufous Fantail*	October	April
Grey Fantail*	September move south	May move north - some sedentary
Spangled Drongo	August	April
Black-faced Cuckoo-shrike*	August	March. In 1927 stayed all year
Cicadabird	November	January
White-winged Triller	October	March
Dusky Woodswallow	August	May
Tree Martin	July	February. In 1931 stayed all year
Fairy Martin	August	February. In 1927 stayed all year
Welcome Swallow*	August	March
Singing Bushlark	November	February
Skylark	July	November
Glamorous Reed Warbler	October	February
Rufous Songlark	October	February
Fuscous Honeyeater	May	September
White-plumed Honeyeater	May	September
Silvereye (Tasmanian subspecies)	August-October	February-May

Threatened and Regionally Rare Species

The local status of species listed under the *Biodiversity Conservation Act 2016* and those that are seldom detected in the Tapitallee area are considered below. The accounts are based on Elliott's notes and recent observations.

Australian Brush-turkey *Alectura lathami*

Not recorded by Elliott but his notes state it was once common on Brown's and Cambewarra Mountains. Elliott states that in 1886 the Australian Museum purchased three eggs from J. Yardley of Cambewarra.

One bird was observed in June 2009, nesting was recorded in December 2019 (J. Elliott pers. comm.) and the records are currently the southern limit of the species. Historically Australian Brush-turkey ranged as far south as Cape Howe on the NSW-Victorian boarder (Jones and Göth 2008).

Black Bittern *Ixobrychus flavicollis*

Not recorded by Elliott. One bird was seen in the mid 1990s along Bengalee Creek and another beside the Shoalhaven River at Bengalee Reserve in 2012.

White-bellied Sea-eagle *Haliaeetus leucogaster*

Elliott states "20.6.27 Observed three soaring over Top Paddock.

19.1.34 I saw one flying southward, fairly low, over the "*Old Tarts*". Close to *Milburn*. A Wedge-tailed Eagle took chase."

In recent times White-bellied Sea-eagles were regularly seen along the Shoalhaven River at Riversdale.

Little Eagle *Hieraaetus morphnoides*

Elliott states "16.6.41 I saw the first bird at lower end of farm.

29.6.41 Heard one call and then observed it.

2.8.41 Heard on call and observed two birds.

13.8.41 Observed one catch a young rabbit and eat it.

14.11.42 Observed one swooping."

One bird seen by the author in December 2019.

Square-tailed Kite *Lophoictinia isura*

Elliott did not record this species. Nesting observed at Bangalee Reserve (Daly and Evison 1996). This bird is now frequently observed at North Nowra, south Nowra and Worrigee during spring and late summer.

Latham's Snipe *Gallingo hardwickii*

Elliott states "9.2.30 One seen about the bush below old dairy and on the following day.

20.1.38 Ray and Jim report a bird that appears to be this species over about Goodger's orchard (in creek)."

Not recorded in recent times but seen in the broader area near Brundee Swamp.

Bush Stone Curlew *Burhinus grallarius*

The Bush Stone Curlew has suffered a considerable decline within NSW since the introduction of the Red Fox. Elliott states that the species "Was originally quite plentiful about Cambewarra but shooting thinned the birds out to a deplorable extent while the Fox has completed the work of extermination." Another entry states "14.11.38 Thos Binks, Cambewarra, said he had heard one about 12 months ago in the bit of bush west of his home. He said that in the early days a party of 15 or so frequented the area south of his big creek while other favourite spots for parties were at Brown's (Faulk's) and Pheney's farms in Cambewarra and in the north-west of Crawford's farm at west Cambewarra."

Although Bush Stone Curlew had not been detected in the Cambewarra district for a considerable period a few animals have been found in the Shoalhaven. One bird was brought to Nowra NPWS staff in 1998 (B. Gray pers. comm.). The bird, caught at Shoalhaven Heads was injured and later released. Another animal was found in 2003 as it was found distressed, running along a fence in the industrial estate south of Nowra. The area had been bulldozed for development and the bird was trying to enter the cleared, fenced area. The informant indicated the bird had a mate nesting on the site and that the nest was bulldozed (G. Hawkins pers. comm.).

Superb Fruit-dove *Ptilinopus superbus*

One bird was found in 1997 beside Illaroo Road having died after flying into a window (D. Wright per. comm.).

Glossy Black Cockatoo *Calyptorhynchus lathami*

Elliott states "30.1.30 Today I saw four of these birds near our old home. They were travelling northwards and alighted on a tree on the hill north of the dairy buildings."

In recent times the area Glossy Black Cockatoos have been seen feeding on Black She-oaks *Allocasuarina littoralis* beside Illaroo Rd, Bangalee Reserve and various locations in forest along the Shoalhaven River escarpment.

Gang-gang Cockatoo *Callocephalon fimbriatum*

Elliott states "Fairly common about this district especially

westwards towards Budgong, Burrier and beyond. Two specimens were collected by Thorpe at Cambewarra for the Australian Museum in November 1881 (Specimen Numbers 11203-4).

19.4.29 Saw five near old home for the first time.

11.1.31 I had an excellent view of trustful pair in the Forest.

3.1.32 Saw nine on The Forest at Top Flat gully. At least four were males.

3.6.38 A pair were over here at home as I worked this evening.

8.7.40 Two flew over, going south."

In recent times Gang-gang Cockatoo are regularly heard/seen along the escarpment during summer and near the Illaroo Rd x Emery's Rd intersection (G. McDonald, K. Touzal pers. comm.). In the late 1980s they fed in Hawthorn trees on *Milburn*. I destroyed these exotic trees and the birds no longer visit this location.

Little Lorikeet *Glossopsitta pusilla*

Elliott states "Very common about here at times, we have shot two for identification purposes. One specimen was purchased by the Australian Museum from Yardley, Cambewarra in March 1886 (Specimen Number 10251).

6.5.40 On occasions of late I have noticed Lorikeets about the flowering Spotted Gums."

Flocks of 20 Little Lorikeet were frequently seen and heard at Riversdale in 2019, when Spotted Gums were in flower. Elsewhere they are seen/heard calling in late summer as they fly over the landscape.

Powerful Owl *Ninox strenua*

Elliott heard the Powerful Owl call a few times in 1938. In recent times they have been heard calling in May 2006, February 2011, one seen in March 2018 (K. Touzal pers, comm.) and a pair detected calling at several locations in April and May 2020. Two pairs exist in the area. Breeding (duetting pair and adult and chick) recorded in Bangalee Reserve in 2018 (M. Smith pers. comm.)

Barking Owl *Ninox connivens*

Records of the Barking Owl in the region are rare. Elliott states "23.6.29 Saw one at head of Top Flat gully close to The Forest. Only one I have seen to date." During the early 1990s I heard Barking Owls on several times from the headwaters of Bengalee Ck. On one occasion a pair was heard duetting. It has been circa 25 years since this species was recorded and is considered locally extinct.

Sooty Owl *Tyto tenebricosa*

Elliott saw Sooty Owls in 1926, 1929 and 1932. This species has been heard calling from the escarpment forest between Bengalee Creek and Tapitallee Creek during autumn from the late 1980s to 2020. On several occasions in autumn they call repeatedly at dusk from a set location indicating nesting. They have also been detected nesting in Bangalee Reserve (S. Evison pers. comm.) indicating two pairs exist in the area.

Masked Owl *Tyto novaehollandiae*

Elliott (1935) found a fledgling Masked Owl that had fallen from a tree in 1934 and located an adult that had been caught in a rabbit trap in 1936. One pair was detected in Bangalee Reserve in 1992 and chicks were heard begging for food indicating breeding.

Red-browed Treecreeper *Climacteris erythrops*

Elliott saw birds in October and November 1932 on his family's property at Tapitallee. None have been detected in recent times.

Southern Emu Wren *Stipiturus malachurus*

Elliott saw birds at *Red Rocks* in 1931, 1934 and 1939. Recent observations of the species were made in 1998 and 2020 also at *Red Rocks* in wet heathland.

Eastern Bristlebird *Dasyornis brachypterus*

Elliott states "Thorpe collected a female, at Cambewarra in Nov. 1881 (Specimen No. 11192) for the Australian Museum (based on habitat specimen probably collected from Red Rocks NR) while Grant collected two birds here in October 1887 (Specimen Nos 013555-6, the former going to the Adelaide Museum). There is little doubt that these were all procured on top of the range (Barren Mountain) as there appears to have been no other suitable haunt for the species in the locality. That there are still some birds there suggested by us (Elliott and his brother) seeing one at my old home on 13 January 1929 and a few days later. It apparently having been driven from the Barren Mountain by bush fires, which raged at that time which was exceedingly dry.

13 January 1929, I saw one about dusk running and hopping briskly over stones etc in the creek bed above Goodger's boundary and below old home. My attention was drawn to it by its uttering short, sharp notes. It was again seen the following evening, in the bush below the dairy."

During 1998 I conducted surveys at Red Rocks NR, as part of the CRA assessment of forests and detected Eastern Bristlebird in heathland. Surveys in February 2020 confirmed that they persist at this location. In

2015 birds were seen and heard on the Cambewarra Range at Bellawongarah in tall open forest with a dense shrublayer. In 2018 two birds were heard at Bundewallah. The Cambewarra Range supports an isolated population of Eastern Bristlebird that occupies habitats that range from heath to tall open forest.

Pilotbird *Pycnoptilus floccosus*

Elliott states "This bird is historically associated with Cambewarra as a lot of the early information about it (in NSW at least) was gathered on the Cambewarra Range. North has less to say about it in his big work than in his small book of 1889 or 1890; though he states that " Mr J. A. Thorpe and Mr J. Yardley obtained specimens at Cambewarra, where it was also found breeding by Mr Sinclair, a timber getter in November 1886. The eggs and parents were sent to the Australian Museum. I have been through the registers and there are at least eight specimens that have gone into the museum collection from the Cambewarra area, one was collected by Thorpe in November 1881 (11219 in spirits) and three more in November 1884. Two females were purchased from Yardley in January 1886 and one male and one female in December 1886 (0684-5). The species is not so much attached to rainforest bushes as some seem to think but prefers light forest with a dense undergrowth of wild hopweed and the like." Mr C. Gosper heard one specimen at *Red Rocks* in 1998 during the CRA surveys.

Regent Honeyeater *Xanthomyza phrygia*

Elliott detected this species at the intersection of Browns Mt Rd and Flannery Lane. He states on 8 April 1939 "There are so many about the corner (the historic Milk stand corner was at the Flannery Lane – Browns Mt Rd intersection) now that my previous estimate of 20 birds no longer applies and there must be near 50 birds if not a good deal more but it is impossible to calculate anything like accurately as they are widespread and ceaselessly moving about." On 22 April 1939 he comments "While we were at tennis today many were feeding in the trees about the court (historically located near the Flannery lane – Browns Mt Rd intersection) and at one stage they formed a compact flock and performed some manoeuvres about as if unable to decide whether to fly eastwards or remain; eventually they remained. I should certainly think there would be anything from 60-100 birds in this flock and I doubt then if all birds about the vicinity were included in it."

No Regent Honeyeater has been found in the Tapitallee area recently. One bird turned up in Nowra, near the council chambers in September 2018 and spent a few weeks foraging on a planted Mugga Ironbark *E. sideroxylon* that was in blossom. (see photo in Appendix, G. Daly pers. obs.).

Scarlet Robin *Petroica boodang*

Elliott records the decline of this species in the area: "Five specimens from Cambewarra have found their way into the Australian Museum one being brought off Yardley in March 1886 (1024) while four were collected by grant on October 1887 (01383-6).

31.12.30 In the monthly list covering the past five years and relating to our corner of West Cambewarra the records of this species are interesting in as much as they show that the winter movements of this robin are irregular. In 1926 the species was listed in March, April, May, August and September; in 1927 every month from April to September; in 1928 only April and July in 1929 April, May, June, July and October and in 1930 April, May, June, July and August.

27.9.36 I saw five males and some females walking to *Red Rocks*. More were seen later in the day. This convinces me that it breeds (in some seasons at any rate) in fair numbers on top of the range.

14.3.38 First specimen for the season was heard at milkstand corner through the week.

15.4.38 These have become fairly numerous now and the winter migration is now well under way.

26.6.39 First male for winter seen (except for one on road to Nowra on 28.4.39) in horse paddock.

1.9.39 These were very scarce about here this past winter. I have never seen so few as far as I can remember.

18.7.40 Scarce this winter- only seen at rare intervals.

D. Wright recorded this species breeding at *Red Rocks* in September 1984 (unpub. data). No other Scarlet Robins have been found in the Tapitallee area in recent years.

Flame Robin *Petroica phoenicea*

Elliott states, "Three males from Cambewarra were collected by Thorpe in November 1881 for the Aust. Museum (11181-3). A review of nesting records in this restricted locality, covering the seasons 1926-7 to 1930-1, gives the average season as commencing towards the end of August and concluding towards the end of November.

24.1.30 I saw one changing into adult male plumage on the *Old Place*. I saw another similar bird about the same date near the Peach Orchard.

25.5.32 I saw five males in full colour and five grey-plumaged birds at one time in bush paddock, *Milburn*. Unusually large number.

31.12.30 In the monthly lists kept by me during the past five years in figures relating to this species are of interest as they covered the home property with Goodger's and uncle

Willie's. In 1926 it was listed in February, March, May and August. Thence all months till December; in 1927 every month from May onward, while in the following years it was listed as a present for certain in every month species.

14.3.38 A pair was seen in hollow below *Old Tart's* today. This species has not been prominent about here for some years now.

29.6.38 Quite a few have been noticed about here this winter for the first time for some years.

27.9.31 I photographed a nest in a small hollow in a sawn off end of a short log (root) in uncle Willie's north side today.

D. Wright saw this species at *Red Rocks* in 1984 (unpub. data). No Flame Robins have been detected in the Tapitallee area in recent times.

Hooded Robin *Melanodryas cucullata*

Elliott states: "9.8.37 I was attracted to unusual churring calls along the Lower Paddock fence, south-east of the house and saw a grey bird which I took to be a Jacky Winter. The calls being continued, however, I recognised them as being of this species and examination showed that this was definitely the case. It was a female or immature young."

No Hooded Robin have detected in the Tapitallee area in recent times.

Southern Logrunner *Orthonyx temminckii*

Elliott states: "Southern limit Cambewarra Range. J. A. Thorpe procured several specimens." Elliott detected birds in 1931, 1933, 1934 and 1937 with an old nest found on 3 June 1933 and another on 20 August 1933."

In recent time I have heard one pair call regularly from beside Tapitallee Creek. Judging by calling birds they move to the creek during winter and spring from the north in the late afternoon almost daily in spring to proclaim their territory. This cycle was interrupted for several years after I sprayed the lantana in that area as part of actions to regenerate closed forest.

Varied Sitella *Daphoenositta chrysoptera*

Elliott states, "Fairly common in district. I have a few breeding records for the area."

One party observed in 1992.

Olive Whistler *Pachycephala olivacea*

Elliott states: "We have been very suspicious of hearing it here on odd occasions but have yet been unable to make a definite identification. One specimen collected from Cambewarra by J. A. Thorpe in November 1881 (11173). One bird may have been observed beside the big waterfall creek (Bangalee Creek) on 31/12/26." This species has been detected at *Red Rocks* (B. Virtue pers. comm. and D. Wright in 1986).

Dusky Woodswallow *Artamus cyanopterus*

Elliott states "Although not strictly migratory it departs from this locality for a few months every winter. Usually departing in late April or May and returning in August. Its numbers vary greatly each year. A review of nesting records for this restricted locality, covering the years 1926-31 gives the average season as commencing in early October and concluding towards the end of December. Dates for arrival in the locality over this period are: 21 August 1926, 27 August 1927, 19 August 1928, 17 August 1929, 23 August 1930 and 14 August 1931.

25.4.32 Saw the last flock for the season on *Top Flat* of *old home*.

10.5.32 Saw a single bird near *Old Tarts*, unusually late.

14.4.37 Small parties still present and Lil saw 30 on the road (near gate) leading to *Milburn*. Birds stayed till the 29.4.37.

17.8.37 A few seen today about the house and lower paddock, they seemed to be moving on.

28.8.37 A nest was commenced in a hole in a Coral Tree at house but was deserted.

1.9.37 A pair are building in hollow low in an apple tree at calf pen. Another building in a Coral Tree.

2.11.37 Above pair rebuilt in cleft of green tree beside our road through Wilson's and now hold four young

25.11.37 A nest with three eggs is side by side a nest from last season in a burnt-out cleft in a dry tree south of our road to Wilson's.

This species is rarely seen in recent times and is considered to be a late summer-autumn migrant.

Diamond Firetail *Stagonopleura guttata*

Elliott states, "It is a common bird around Cambewarra and in some seasons many nests are found on so small a property as *Milburn* but in other years it appears to be quite scarce. A review of nesting records at *Milburn* from 1934 - 1940 season shows the number of nests located as 1934-5 = 0, 1935-6 = 4, 1936-37 = 4, 1937-38 = 17, 1938-9 = 7, 1939-40 = 9." There have been no Diamond Firetails recorded in the Tapitallee area in recent times. Birds were seen on the property *Gafa*, Kangaroo Valley in 1991.

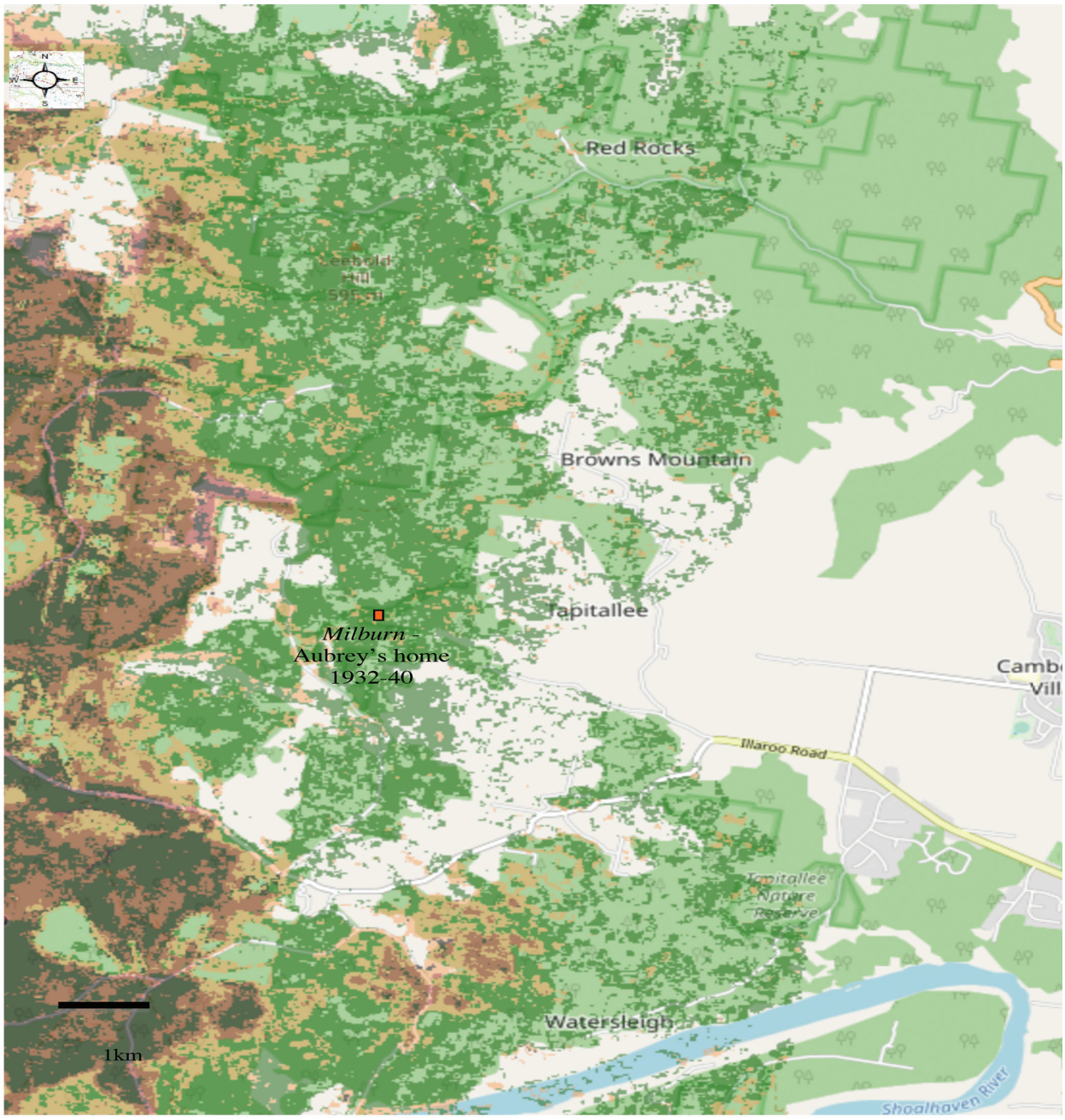

Figure 5. Location of the Tapitallee study area showing FESM fire severity

Note: the burnt areas are orange and brown, light brown is medium – partial canopy scorch and, orange is full canopy scorch/partial and black is full canopy consumption

Recent influences on the status of local birds - the effects of the Currowan wildfire

The 2019-20 wildfires burnt circa 436ha in the Tapitallee area, primarily near the Shoalhaven River and a portion of Emery's plateau (Figure 5). The intensity varied from a loss of shrublayer to crown fire. The Tapitallee area was on the edge of the Currowan - Morton fires (names derived from the RFS website: fires near me).

It was expected that the unburnt areas adjoining the fire would have an increase in bird density. The Yellow-tufted Honeyeater *Lichenostomus melanops* was found in unburnt sites where the species had not previously been detected (K. Touzal and Nicholas Carlile pers. comm.). However, there was generally no increase in the densities of bird species in adjoining unburnt areas (G. Daly pers. obs.). Many birds to the west of the area perished during the fire with nearby residents finding piles of dead animals beside dwellings (A and B Acworth pers. comm.). The birds had gathered in alcoves (covered verandah) but appeared to have died from asphyxiation and or heat stress. Although the Tapitallee area had only a relatively small area burnt (c. 10% of the total area) there was a reduced number of summer breeding, migratory species that passed through the area post fire. Large areas (499,600ha), south of the study area in coastal NSW were burnt and this would

have affected summer breeding migrants. In particular the number of flocks of Yellow-faced Honeyeater migrating north in autumn were reduced. Although no formal counts have been taken prior to the 2020 wildfire several thousand (6-10,000) birds might pass our ridge per hour during autumn. Post fire the number was only a few hundred birds per hour over a few weeks and this probably reflects the fire intensity over a much greater area, further south of the study area.

Discussion

Changes in populations of birds in the Tapitallee area can be attributed to a number of factors. These include shooting animals for the table and sport, the arrival of the Red Fox and subsequent predation of ground nesting species, clearing bush as part of soldier resettlement after the great war followed by regrowth of native vegetation along the escarpment from c1980, drought, translocations, climate change the construction of dams and the 2020 wildfire.

Changes in status in relation to shooting wildlife for food and recreation

Elliott's notes make several references to shooting. "Some people made a profitable sideline of shooting male Superb Lyrebird *Menura novaehollandiae* for their tails, which were worth about 5/- each in good condition." Red Wattlebird: "many are being shot this winter. Shooters appear to be having a great time. I will be glad when the season ends." Bush Stone Curlew *Burhinus grallarius*: "Was originally quite plentiful about Cambewarra but shooting thinned the birds out to a deplorable extent while the fox has completed the work of extermination." Brush Turkey *Alectura lathami*: "Jas Jumsden told me that it was once very common on Cambewarra Mountain. One dry time he shot 24 in a small patch of bush. These were flushed by dogs from the hill above and always flew into this patch." Topknot Pigeon *Lopholaimus antarcticus*: "were numerous about the mountain near Dapto and a lot of unrestricted shooting went on among them." Mo and Waterhouse (2015) cite historic accounts to document the decline of the Topknot Pigeon in the Illawarra. White-headed Pigeon *Columba leucomela*: "This pigeon is falling away before the onslaught of shooters." Grey Goshawk *Accipiter novaehollandiae*: "The white form is shot because it is unusual." Black-shouldered Kite *Elanus axillaris*: "P. Monaghan, Nowra said that in earlier days six used to frequent the eastern side of Worrigee Swamp below Nowra until his brother Arch shot the lot." Australian King Parrot *Alisterus scapularis:* "largely for sport large numbers are shot each year."

Elliott also shot birds. Australian Goshawk *Accipiter fasciatus*: "13.11.38 I shot one this morning early. The colour contrasted strongly with the one I shot a month ago." Collared Sparrowhawk *Accipiter cirrocephalus*: "5.12.38 Bert Goodger told me that he and his wife had each shot a hawk lately. This makes three shot by me and five from his place in one season." These notes provide a snapshot of a different culture and relationship with avifauna to that which exists in 2020.

Changes in status in relation to the arrival of the Fox

Elliott states that his father heard "the first fox in *top paddock* creek; it was not until later that he found out what produced the strange barking." "This was about 32 years ago or about 1907. First rabbits were seen a little after this." This date for the arrival of the Red Fox is in accord with a review of records by Abbott (2011). Predation by fox is highly implicated in the decline of the Bush Stone Curlew (DEC 2006). However, another ground nesting bird, the Masked Lapwing *Vanellus miles* appears to have increased in abundance since the arrival of the Red Fox. Both species aggressively protect their eggs and young so there is a difference in behaviour that allows Red Fox to predate Bush Stone Curlew and not Masked Lapwing.

Influence of the construction of local farm dams

Over the last 30 years a number of dams have been constructed in the Tapitallee area. These have provided habitat for aquatic birds and contributed to the increase in abundance of species such as the Australian Wood Duck *Chenonetta jubata*, White-faced Heron *Egretta novaehollandiae* and Pacific Heron *Ardea pacifica.*

Changes in status in relation to clearing native vegetation

Along the east coast of Australia there was a massive effort to clear the bush as part of the soldier resettlement program post World War 1 (Greer 2013; Watson 2014). Since that time native forests have regrown over much of the steep land. In the Tapitallee area the forests that colonised the more fertile soils were extensively cleared for dairy. Since then, the steeper slopes have been allowed to regenerate and the forest on these steeper slopes is now approximately 90 years old. This forest is too young to have formed hollows large enough to cater for the nesting requirements of large forest owls and denning requirements for large forest dependant fauna (Mackowski 1984; Lindenmayer *et. al.* 1991; Millage *et al.* 1991; Gibbons and Lindenmayer 2002; Kavanagh and Wheeler 2004). Fortunately a block of rainforest beside Tapitallee Creek (Dick Flannery's private reserve) and the rocky areas below the escarpments were spared. The forests on sandy soils near the Shoalhaven River were not cleared as the soil's fertility was inadequate to support agriculture. Consequently, there are blocks of old growth forest in the Tapitallee area that act as reservoirs for birds and other wildlife to recolonise regenerating landscapes (Daly 2018a). The portion of Cambewarra NR at Tapitallee supports old growth rainforest and tall open forest that provides habitat for species associated with these vegetation types.

Conversely west of the Great Dividing Range there has been a continual loss of native vegetation since European settlement. The woodland ecosystems in temperate south-eastern and south-western Australia have been the most affected by vegetation clearance (Saunders 1997). In NSW between 1998-2015 some 517,956ha of native bushland were cleared resulting in the loss of 10.7 million birds (Taylor and Dickman 2018). The repeal of the Native Vegetation Act in 2017 has been followed by a near tripling of tree clearing rates (Taylor and Dickman 2018). The decline of the iconic Regent Honeyeater is seen as the "flagship" for woodland birds that have large home ranges. Clearing for agriculture has left a highly fragmented landscape with a continual loss of paddock trees from senescence, eucalypt dieback, harvesting for fence posts or firewood, or drought-induced stress. This loss is inhibiting the ability for Regent Honeyeaters to disperse (Department of Environment 2016). Elliott's notes provide an insight to the number of Regent Honeyeater that historically visited flowering Spotted Gum forests on the south coast of NSW, indicating how important this vegetation community is for this bird.

Changes in status in relation to drought, translocations and climate change

Blakers *et al.* (1984) states that Galah *Cacatua roseicapilla*, Little Corella *C. sanguinea* and Crested Pigeon *Ocyphaps lophotes* are examples of species historically considered to be typical of Australian arid and semi-arid regions that have invaded temperate parts of Australia over the past 100 years. This may also be the situation with the Sulphur-crested Cockatoo *Cacatua galerita* (Hoskin 1991). It is widely agreed that, rather than climate change, it is land-cover and land-use changes (primarily vegetation clearance and provision of artificial water sources) that have caused southern range expansions, and similar expansions along the eastern seaboard (Reid 2003).

In the Shoalhaven this may be the situation for the Galah and Crested Pigeon but the Little and Long-billed Corella's invasion of the south coast appears to be a result of the trade in wild birds. In the 1980s pet shops sold many Corellas and some escaped (G. Daly pers. obs.). Bird traders, that is people who under licence collected baby birds from the wild, had a habit of releasing excess animals at the end of a season (G. McDonald pers. comm.). I first observed Little Corellas in Nowra in 1985 and Long-billed Corellas in 1986. They colonised the town from the north using the bridge over the Shoalhaven River as a roost for a period but then shifted to roosting in trees in the town's parks.

Elliott states that the Rainbow Lorikeet *Trichoglossus moluccanus* was well known in the district but now rarely seen. He had not seen the species locally. This aligns with historic records of the species being abundant in the late 1800s (Crome and Shields 1992) thereafter declining to a point where it was recorded as first breeding in Sydney in 1947 (Hoskin 1991). Rainbow Lorikeets have expanded their range and density in the Shoalhaven over the last decade. They were absent from our property for the first 20 years and are now regular visitors. Currently thousands of Little Corellas and Rainbow Lorikeet live in the Nowra central business district roosting in trees beside streetlights (SMH 2019).

The mobility of birds allows them to respond to changes in the environment more rapidly than non-volar species. Torresian species such as the Cattle Egret, Figbird, Channel-billed Cuckoo, Common Koel *Eudynamys scolopacea*, Pacific Baza *Nisaetus cirrhatus,* Square-tailed Kite, Bar-shouldered Dove *Geopelia humeralis*, Noisy Pitta and Dollarbird have expanded south (Keast 1995; McAllen *et al.* 2007). This expansion may be attributed to landscape changes and/or a warming climate (Reid 2003). The expansion of the Channel-billed Cuckoo may be aligned with an increase in the Pied Currawong population since the 1980s (Chafer *et al.* 1999).

A link has been established between recent increases in global temperatures and changes in the timing of a few Australian landbird migrations (Chambers 2005). A general comparison with arrival and departure dates recorded by Elliott and recent times shows no major variations from the 1930s to today. However, the area has been colonised by additional seasonal migrants such as the Channel-billed Cuckoo, Pacific Baza, Noisy Pitta and possibly the White-throated Gerygone.

Some exotic species such as the House Sparrow *Passer domesticus*, Spotted Turtle-dove and Common Starling *Sturnus vulgaris* appear to have reduced in abundance with the House Sparrow becoming locally extinct. Other exotic species such as the Red-whiskered Bul-bul *Pycnonotus jocosus*, Common Myna *Acridotheres tristis* and Common Blackbird *Turdus merula* are expanding their ranges and are becoming more abundant. Similar trends have been recorded elsewhere in NSW (Barrett *et al.* 2007).

By 2030, the number of hot days for inland NSW is projected to increase by 10–20 days annually, with an increase of over 40 days annually by 2070 (State of the Climate report 2018). Locally, temperatures during Summer also appear to be increasing. On 1 February 2020 several residents recorded 48°C in the Tapitallee area (J. Hilditch and K.Touzal pers. comm.).Temperatures above 45°C, especially over several days appear to be particularly damaging for birds (McKechnie *et al.* 2012). As predicted by McKechnie et. al. (2012) the frequency of very hot weather events and extreme maximum air temperatures have increased (CSIRO 2020). The impact of excessive heat on avifauna is not well documented along the east coast but is likely to impact populations, especially in combination with drought.

The 2020 Currowan wildfire severely impacted bird populations. The author observed the charred remains of Yellow-tailed Black Cockatoo indicating that even large species with extensive home range perished. To the west of the study area Australian King Parrots, Rainbow Lorikeets and White-headed Pigeons were seen at feeding stations in burnt areas several months after the fire. In one location the landowner reported Rainbow Lorikeets had never been previously seen. This indicates that larger more mobile birds can recolonise burnt areas quite rapidly if the adjoining areas are unburnt. However, severely burnt areas deep within the core of the wildfire, in Morton and Jerrawangala NPs, are eerily quite with a near absence of small non-migratory passerines one year after the fires (G. Daly pers. obs.).

Aubrey Elliott (Figure 6) made a significant contribution to our knowledge of the avifauna in the Tapitallee area by recording detailed notes and publishing ten articles (see References). His notes have allowed a comparison of the birds between the periods of 1926 to 1940 and 1985 to 2020 and enabled changes in bird status to be examined. Undoubtedly there will be further changes to the area's birds as the suburb becomes more urbanised and the effects of climate change, such as increased fire frequency and severity, further impact the area.

Figure 6. Aubrey Elliott relaxing during a field trip. Image courtesy J. Elliott.

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APPENDIX I

Appendix . Images of local birds with additional information for each species.

Pacific Baza, a species that has colonised the area from lower latitudes (see text). Image by G. Daly taken at Tapitallee.

Historically seen in flocks of thousands (Mo and Waterhouse 2015) the Top-knot Pigeon population was decimated early after European invasion. It was still shot for the table during the 1930s and 1940s. Fortunately shooting birds generally has not occurred in recent times and the population is recovering with flocks of 30-50 seen during periods when fruit is abundant. Image by G. Daly taken at Tapitallee.

Elliott never observed White-headed Pigeons in the area but if they did exist would have almost certainly have been shot. Currently the species is common being fed by people and taking advantage of fruit from planted Camphor Laurel *Cinnamomum camphora*. Image by G. Daly taken at Tapitallee.

Bush Stone Curlews disappeared as a result of the Red Fox colonising the area. They are locally extinct. Photograph by G. Daly of captive bird.

APPENDIX I

The Scarlet Honeyeater is a summer breeding migrant that usually forages on *Eucalyptus* and *Corymbia* blossom. Image by G. Daly taken at Tapitallee.

This Regent Honeyeater turned up in Nowra in September 2018 and foraged on the flowering Mugga Ironbark *Eucalyptus sideroxylon*. Elliott observed flocks of 50-100 birds at Tapitallee in April 1939. This species has declined in abundance and distribution as a result of clearing of native vegetation in Victoria and NSW, particularly west of the Great Dividing Range. Image courtesy of D. Crowley taken at Nowra.

The Silvereye was the most frequently detected species during systematic surveys. Large numbers of the Tasmanian race migrate from that state to Queensland along the east coast during autumn. Image of mainland form courtesy of K. Touzal taken at Tapitallee.