

Two years of bird surveys at Bootawa Dam, Bootawa, New South Wales

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Received 8 October 2023, accepted 15 October 2023, published online 30 October 2023.

Eleven bird surveys were undertaken at Bootawa Dam, Bootawa, New South Wales (NSW), spanning two years between September 2020 and July 2022. A total of 103 species were recorded during the surveys, with an additional seven species during other visits. A total of five species were recorded breeding during the surveys.

Of the 110 species recorded, only one, White-bellied Sea-Eagle *Haliaeetus leucogaster* is listed as vulnerable in NSW. However, Glossy Black-Cockatoo *Calyptorhynchus lathami*, which is also listed as vulnerable within NSW, has also been observed on the site.

With 153 ha of the 220-ha site covered with a mix of mature and maturing native vegetation, the site provides habitat for resident avian and small to medium sized mammal species, and refuge for migrating species throughout the broader landscape within the surrounding, predominantly, cleared grazing landscape.

INTRODUCTION

Habitat loss for agriculture is a major threat to biodiversity, not only in Australia (Dorrough *et al.* 2007; Brady *et al.* 2009) but globally (Attwood *et al.* 2008; Henle *et al.* 2008; Hendrickx *et al.* 2007). Although these papers primarily discuss the impacts on arthropods, they form the lower levels of the food chain and thus directly impact many avifaunal species. Therefore, preserving and enhancing native vegetation within a cleared or semi-cleared landscape is encouraged.

Located approximately 8 km west of Taree, on the lower mid-north coast of New South Wales (NSW), is Bootawa Dam (31.92°S, 152.38°E), the major water supply for the larger urban centres of Wingham, Taree, Tuncurry and Forster and many smaller surrounding villages (Figure 1). Construction of the dam wall commenced in the early 1960s with completion of the wall and associated infrastructure in 1967. The water treatment plant was rebuilt and commissioned in 2010 to accommodate more modern standards of water filtration and treatment and increased capacity to service a growing population. Water for the dam is pumped from the nearby Manning River and is not reliant on catchment runoff.

When acquired for water storage purposes in 1965, the original parcel of land comprised 121 ha. Boundaries of this parcel included most of the

valley ridgeline, upstream of the dam wall, except for a small section to the east. Bordering the northern boundary, an additional parcel of land, 94 ha in size, was acquired in 1973. In 2013, 5 ha of land was purchased from the neighbours to incorporate the short eastern ridgeline section. The total site now covers 220 ha, of which the dam footprint is approximately 23 ha.

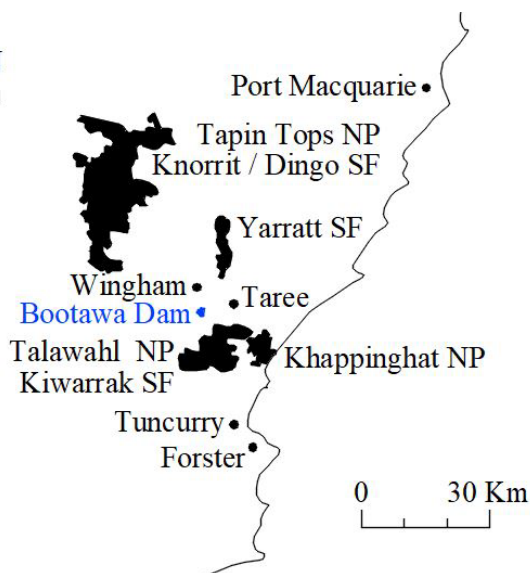


Figure 1. Locality sketch

The nearest Bureau of Meteorology (BOM) recording station (No. 060030) is located in Taree, approximately 10 km east-north-east of Bootawa

Dam. Average rainfall for the area is 1182 mm (1881 to 2022) from an average of 90 rain days per year. The mean January maximum temperature is 29.0°, while the mean July minimum temperature is 5.9° (1907 to 2005) (Bureau of Meteorology). However, the survey period covered some of the driest and wettest periods in the region. Many surrounding areas were still recovering from the dry of 2019 and the devastating fires in the later parts of 2019 and into early 2020. This was followed by significant rainfall in late 2020 and early 2021 with a resultant flood in March 2021. Significant rainfall was received again at the end of 2021 and into early 2022. While no direct impact could be measured on avian records or recording rates from these extreme climatic conditions, they did impact access to the site to undertake the surveys, on numerous occasions (also see Methods).

Site Description

Similar to much of the current surrounding landscape, the original site was predominantly cleared grazing pasture with remnant trees, many of which are over 80 years old (C. Stone pers. comm.). While much of the ground immediately surrounding the dam was routinely slashed, the northern parcel was allowed to regenerate with naturally occurring floral species. Additionally, where slashing was more difficult in small wet gullies and areas with steeper grades, other pockets of native vegetation also flourished.

Vegetation on the northern parcel and in other pockets is a mix of wet and dry sclerophyll forest, open forest with grassy understorey and dry rainforest. The canopy includes Pink Bloodwood *Corymbia intermedia*, White Mahogany *Eucalyptus acmenoides*, Thick-leaved Mahogany *E. carnea*, Tallowwood *E. microcorys*, Grey Ironbark *E. paniculata*, Small-fruited Grey Gum *E. propinqua*, Brush Box *Lophostemon confertus* and Turpentine *Syncarpia glomulifera*. The sparse mid-stratum is layered, consisting of a mix of Forest Oak *Allocasuarina torulosa* and acacia species while the ground layer is mid-dense comprising graminoids, forbs and twiners (Trees Near Me NSW 2023).

In 2008, many of the areas previously slashed were planted out with a select range of forestry tree species for the purpose of obtaining carbon credits (Figure 2). The forestry mix consisted of *Corymbia variegata*, Blue-leaved Stringybark *Eucalyptus agglomerata*, Blackbutt *E. pilularis*, Grey Gum *E. punctata*. Management of these plantation areas included periodic slashing between the rows of and individual trees. In more recent years, only basic

slashing between the rows has continued, which has allowed native floral species to infill between the individual trees and start to form an understorey. Recently, several small sections of trees have been removed to allow plantings of more Koala *Phascolarctos cinereus*-friendly species to occur.



Figure 2. Map of Bootawa Dam showing revegetation and survey areas. R08 = areas revegetated in 2008; R13 = area revegetated in 2013; STS = Trig Station survey area; SSS = Sclerophyll Slope survey area; SP = Plantation survey area; and SD = Dam survey area. Refer to Site Description and Methods for more details.

Following the purchase of the eastern parcel in 2013, most of the area was revegetated with a mix of endemic species for habitat (Figure 2). Species comprised Native Quince *Alectryon subcinereus*, Rose Myrtle *Archirhodomyrtus beckleri*, Pink Bloodwood, Jackwood *Cryptocarya glaucescens*, Blueberry Ash *Elaeocarpus obovatus*, Flooded Gum *Eucalyptus grandis*, Tallowwood, Small-fruited Grey Gum, Forest Red Gum *E. tereticornis*, Sandpaper Fig *Ficus coronata*, Cheese Tree *Glochidion ferdinandii*, Brush Box, White Cedar *Melia azedarach*, Plum Pine *Podocarpus elatus*, Turpentine and Red Cedar *Toona ciliata*.

The combined area of mature and maturing vegetation totals approximately 153 ha. Covering 78% of the site, excluding the dam footprint, habitat within the Bootawa Dam site is sufficient in size to accommodate resident avian and small to medium sized mammal species and provides a refuge for transient or migrating species. Within the broader landscape, Bootawa Dam is centred between

Talawahl and Khappinghat National Parks and Kiwarrak State Forest to the south and south-east, Yarratt State Forest to the north-east and Tapin Tops National Park and Knorrit and Dingo State Forests to the north-west (**Figure 1**).

METHODS

Initially, surveys were to be undertaken every second month commencing in September 2020 and targeting a date in the middle of each survey month. Unfortunately, extreme climatic conditions (see introduction above) impacted the timing of surveys being completed, with one survey cancelled (March 2022) and another one (March 2021) set back by three weeks due to tracks being too wet to traverse.

The dam site was entered within one hour of sunrise. Four survey areas, Trig Station, Sclerophyll Slope, Plantation and the Dam (see descriptions below; **Figure 2**), were surveyed in the same order each visit. Birds were also recorded generally within the site between survey areas. Birds utilising a specific survey area were recorded within the survey area. Birds observed flying over the survey area were excluded from the specific survey area but included in the general survey area. Counts for species recorded are an estimate of individuals seen within each area or the general area. Observations of birds on the dam were made from several different locations with total numbers of birds averaged between all the locations.

Records from individual survey areas were entered into the BirdLife Australia atlas (Birddata; <https://birddata.birdlife.org.au/>) as either a 500-m area search (Sclerophyll Slope, Dam) or a 2-ha, 20-min search (Trig Station, Planation).

Trig Station (31.9267°S, 152.3850°E) is located at the eastern end of the site, within the parcel that was purchased and revegetated in 2013, and contains the most recent revegetation works on the site. At the commencement of surveys, trees were approximately three metres high with an understorey of Blady Grass *Imperata cylindrica*, Bracken Fern *Pteridium esculentum* and Kikuyu *Pennisetum clandestinum*. A small, steep gully contained several large, > 15 m high, remnant trees. This survey area was considered a '20-minute 2-ha' site.

Sclerophyll Slope (31.9140°S, 152.3820°E) is located within the northern parcel acquired in 1973. Vegetation within this area was the most mature of the survey areas, with developed canopy, mid-stratum and ground layers. This survey area was considered a 'within 500-m' site.

Plantation (31.9219°S, 152.3784°E) is one of the many areas revegetated fifteen years ago with forestry species. There has been active slashing between the rows over the years and pruning of lower branches of the forestry trees during the early years. This particular patch is located between a small, vegetated gully and an older native

forest remnant. This survey area was considered a '20-minute 2-ha' site.

Dam (31.9200°S, 152.3749°E) consisted of the large, open water body of the dam proper and includes the emergent macrophyte vegetation around the edge. Water levels varied during the course of the total survey period but were not recorded. This survey area was considered a 'within 500-m' site.

Breeding records were based on the following criteria: active visible nest, feeding of a dependent juvenile or observing a recently fledged juvenile.

Total species and individuals in the Trig Station and Plantation survey areas were statistically tested using the Yates-corrected Chi-square test (Fowler & Cohen 1994). For one degree of freedom, Chi-square results between 3.84 and 6.62 are considered to be 'Significant', while over 6.63 the result is 'Highly Significant'.

A fauna survey was undertaken at Bootawa Dam between 11 and 15 October 2020, by Midcoast Council. This survey included the placement of two sound recording devices (Wildlife Acoustics Song Meter SM4). Recordings were made between 1930h and 2230h in the evening and then again from 0300h to 0600h in the morning. These recordings were analysed for avian calls and included as additional species.

RESULTS

From all surveys, 103 species of birds were recorded, with an additional seven species recorded during other visits (refer **Appendix**: available at <https://www.hboc.org.au/wp-content/uploads/Bootawa-surveys-Appendix-The-Whistler-Vol-17.pdf>). Of this total, only one species, Whitebellied Sea-Eagle *Haliaeetus leucogaster*, is listed as vulnerable under the NSW *Biodiversity Conservation Act 2016* (BC Act), with no species listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. However, an additional species, the Glossy Black-Cockatoo *Calyptorhynchus lathami*, which is listed as vulnerable under the BC Act, has been observed regularly onsite by staff (C. Stone pers. comm.). The average number of species recorded during the 11 visits was 46 (32-58; **Table 1**) with the average number of individuals recorded being 216 (133-369; **Table 1**).

Table 1. Summary of birds recorded during surveys at Bootawa Dam, Bootawa.

Year	Month	Species	Individuals
2020	12 September	48	142
	22 November	58	217
2021	24 January	52	270
	11 April	46	303
	29 May	37	133
	11 July	32	168
	19 September	54	201
	14 November	53	171
2022	16 January	49	166
	25 May	35	232
	31 July	46	369
Total Average		46	216

Table 2. Summary of birds recorded in individual areas during surveys at Bootawa Dam, Bootawa. Refer to Methods for descriptions of individual survey areas. Sp - species recorded; Ind - individuals recorded.

Year	Month	Trig Station		Sclerophyll Slope		Plantation		Dam		General	
		Sp	Ind	Sp	Ind	Sp	Ind	Sp	Ind	Sp	Ind
2020	12 September	7	11	17	39	9	20	7	38	26	44
	22 November	8	22	20	37	2	2	10	95	36	69
2021	24 January	9	23	12	20	7	12	7	107	39	106
	11 April	7	9	9	12	5	6	11	204	29	75
	29 May	1	2	11	18	2	2	6	56	24	55
	11 July	4	10	11	18	6	8	6	97	19	35
	19 September	14	24	14	30	6	8	8	47	36	92
	14 November	8	12	18	30	5	7	8	44	37	78
2022	16 January	12	19	15	22	8	13	5	23	34	88
	25 May	5	14	5	5	5	9	9	162	19	42
	31 July	4	11	10	18	10	20	11	254	28	66
Total Average		7	14	12	21	6	10	8	102	30	68

Table 3. Species recorded in 70% or more of surveys at Bootawa Dam, Bootawa.

Species	RR %	Species	RR %
Hardhead	100	Noisy Miner	73
Pacific Black Duck	82	Yellow Thornbill	91
Great Crested Grebe	100	Golden Whistler	100
Wonga Pigeon	73	Grey Shrike-thrush	100
Purple Swamphen	91	Eastern Whipbird	91
Eurasian Coot	73	Black-faced Cuckoo-shrike	82
Little Pied Cormorant	91	Australian Magpie	100
Little Black Cormorant	91	Pied Butcherbird	73
Laughing Kookaburra	91	Grey Fantail	100
Eastern Rosella	82	Torresian Crow	100
Rainbow Lorikeet	100	Eastern Yellow Robin	91
White-throated Treecreeper	100	Welcome Swallow	73
Lewin's Honeyeater	100	Silvereye	82
Yellow-faced Honeyeater	100	Red-browed Finch	73

Table 4. Species recorded across all terrestrial survey sites during surveys at Bootawa Dam, Bootawa. Refer to Methods for descriptions of individual survey areas.

Species	Trig Station		Sclerophyll Slope		Plantation	
	Average	Min-Max	Average	Min-Max	Average	Min-Max
Laughing Kookaburra	2	1-2	2	1-2	1	1-1
White-throated Treecreeper	2	2-2	1	1-2	1	1-1
Scarlet Honeyeater	2	1-2	4	3-5	2	1-3
Eastern Spinebill	1	1-1	2	1-2	1	1-1
Lewin's Honeyeater	1	1-1	2	1-3	1	1-3
Yellow-faced Honeyeater	2	1-3	2	1-3	2	1-4
Spotted Pardalote	2	2-2	2	1-2	2	1-2
Yellow Thornbill	5	5-5	3	2-4	3	2-4
Brown Thornbill	2	1-3	2	1-2	2	2-2
Golden Whistler	2	1-2	2	1-5	1	1-3
Grey Fantail	1	1-2	2	1-3	2	1-2
Eastern Yellow Robin	1	1-1	1	1-2	1	1-1
Silvereye	3	1-5	2	2-4	2	2-3
Red-browed Finch	2	2-2	2	2-3	2	2-2

Numbers of species and individual numbers recorded within each survey area, and generally, are shown in **Table 2**.

Of the 28 species recorded on 70% or more surveys and considered to be resident, ten were recorded in all surveys (**Table 3**). Twenty species were recorded in a single survey only. Five species were recorded breeding during the surveys; Great Crested Grebe *Podiceps cristatus*, Fan-tailed Cuckoo *Cacomantis flabelliformis*, Masked Lapwing *Vanellus miles*, Large-billed Scrubwren *Sericornis magnirostra* and Golden Whistler *Pachycephala pectoralis*.

Fourteen species were recorded in all terrestrial survey areas (**Table 4**), however only ten of those species are considered resident (**Table 3**).

The Trig Station and Plantation survey areas are similar in size, each being approximately 2 ha. The Chi-square test produced a non-significant result ($\chi^2_1 = 0.91$) for total species recorded between the two areas ($n = 31$ and $n = 23$ respectively). However, a comparison of total individuals between the two respective areas (Trig Station $n = 152$; Plantation $n = 107$) was highly significant with $\chi^2_1 = 7.47$, $P < 0.01$. This result reflects the different avian density supported by the vegetation structure of the two sites. Planted and managed for forestry purposes in 2008, the Plantation area contains basically no under or mid-storey, with lateral tree branches removed, and a monoculture canopy at a consistent height of select eucalyptus species. Although only planted 5 years later in 2013, the lower portion of the canopy of the mixed species in the Trig Station area blended with the existing ground-layer. The upper canopy layer is uneven in

height and the lateral branches of the tree species were allowed to develop, creating a broad vegetation matrix to support more foraging individuals.

DISCUSSION

The following paragraphs provide some commentary on the observations of the various orders / family groups of birds recorded during the individual surveys and generally. For a full list of species recorded during the surveys, generally and additionally, refer to the **Appendix**.

Brush-turkey and Quails (Galliformes): The only species recorded within this order was the Brown Quail *Synoicus ypsilophorus*. It was recorded by call only during the faunal survey. Being a cryptic species, its presence on the site is probably more common than indicated.

Ducks (Anseriformes): Moderately represented by five species with Hardhead *Aythya australis* recorded in all visits ($n = 11$) and Pacific Black Duck *Anas superciliosa* considered resident ($n = 9$) at the dam. Hardhead numbers averaged 18, but varied considerably (1-68).

Grebes (Podicipiformes): All three grebe species were recorded on the dam with Great Crested Grebe recorded in all surveys ($n = 11$) and breeding. Interestingly, Great Crested Grebe is considered resident within the Hunter area on large water bodies (Williams 2020), however Birddata considers the area outside the species' normal range. There

was an average of 18 individuals recorded across all the dam surveys ranging from 4 to 31. In January 2021, 16 juvenile birds of varying ages were accompanied by 15 adult birds. Numbers of Australasian Grebe *Tachybaptus novaehollandiae* also varied considerably (1-60) with a resultant average of 31 ($n = 7$).

Pigeons and Doves (Columbiformes): Moderately represented by six species, with Wonga Pigeon *Leucosarcia melanoleuca* the only species classed as resident ($n = 8$). The majority of these records were made when traversing along access tracks throughout the site.

Frogmouths and Swifts (Caprimulgiformes): Both Tawny Frogmouth *Podargus strigoides* and Owlet-nightjar *Aegotheles cristatus* were recorded by call, once and twice respectively, during site visits, however both species were regularly heard calling on the audio recordings during the fauna survey. With both species being nocturnal and cryptic, these species are more than likely breeding residents on the site.

Cuckoos (Cuculiformes): A well represented order with six species recorded moderately to infrequently during all site visits. Fan-tailed Cuckoo, the most commonly recorded cuckoo species ($n = 7$), was recorded breeding with a recently fledged individual being fed by a Large-billed Scrubwren.

Rails (Gruiformes): Both Purple Swamphen *Porphyrio porphyrio* and Eurasian Coot *Fulica atra* are considered resident on the site, recorded in ten and eight surveys respectively. Coots were only recorded on the main dam with an average of 43 (2-120) individuals during all visits. However, swamphens only utilised a small downstream sediment pond, with macrophytic growth dominated by cumbungi *Typha orientalis*, and grassed areas adjacent to the main treatment plant structure.

Hérons, Egrets, Ibis and Cormorants (Pelecaniformes): Only five species were recorded within this diverse group of water dependent birds. Both Little Pied Cormorant *Microcarbo melanoleucos* and Little Black Cormorant *Phalacrocorax sulcirostris* were recorded in all but one of the dam surveys ($n = 10$). Although predominantly observed perched on the main dam pontoon structure, both species also utilised the dam for fishing. Wading species, such as Great Egret *Ardea alba* and White-faced Heron *Egretta novaehollandiae*, were only observed on a few ($n =$

2) to moderate ($n = 4$) occasions, respectively, foraging around the dam edge.

Waders, Plovers and Button-quails (Charadriiformes): Commensurate with the location and habitat for this diverse order of predominantly coastal type species, it was only represented by four species. Masked Lapwing was recorded moderately frequently ($n = 7$), but not sufficiently to be considered resident, and the observation of adults with two small runners confirmed breeding of the species. Painted Button-quail *Turnix varius* was recorded during one survey, however being cryptic and there being plenty of suitable habitat, it is more than likely a resident species.

Owls (Strigiformes): Within this order, only the Southern Boobook *Ninox boobook* was heard during the fauna survey recordings and could be considered resident on the site. However, the presence of suitable roosting and nesting habitat onsite and within the surrounding landscape that is predominantly cleared grazing, would also be suitable for use by Barn Owl *Tyto alba*.

Kites, Eagles and Goshawks (Accipitriformes): Of the four species recorded during the surveys, both White-bellied Sea-Eagle, which was observed on five occasions, and Wedge-tailed Eagle *Aquila audax*, recorded twice, utilise the dam for hunting. Wedge-tailed Eagle has been observed hunting Eurasian Coot off the water's surface (C. Stone pers. comm.).

Bee-eater, Dollarbird and Kingfishers (Coraciiformes): Only Laughing Kookaburra *Dacelo novaeguineae* is classed as resident ($n = 10$), of the four species observed within this order. An Azure Kingfisher *Ceyx azureus* was observed during our site induction tour, but was not sighted subsequently.

Falcons (Falconidae): Only a single Nankeen Kestrel *Falco cenchroides* was recorded on one occasion from this order, circling over the slashed grass downstream of the dam wall. Abundant grazing land surrounding the dam site would provide more suitable habitat for this species to hunt over.

Cockatoos, Parrots and Lorikeets (Psittaciformes): Only Eastern Rosella *Platycercus eximius* and Rainbow Lorikeet *Trichoglossus moluccanus* were recorded sufficiently to be considered resident ($n = 9$ and $n = 11$ respectively). Predominantly, both species were observed within the scattered trees, which include numerous large

bottlebrush *Callistemon sp.* shrubs, in the vicinity of the main building structure. Interestingly, Sulphur-crested Cockatoo *Cacatua galerita* was recorded during the evening fauna survey recordings only, suggesting individuals utilise the site for roosting, and possibly nesting, but had departed, to forage, prior to our arrival onsite to undertake surveys.

Passeriformes

Pittas (Pittidae): Noisy Pitta *Pitta versicolor*, the only pitta within the family to be found locally within the Hunter Region (Williams 2020), was heard calling numerous times throughout the recordings from the fauna survey. The many forested gullies on the site provide a substantial amount of suitable habitat for this ground-foraging species, which is more-than-likely, an annual winter migrant to the site.

Bowerbirds (Ptilonorhynchidae): Satin Bowerbird *Ptilonorhynchus violaceus*, the only species within this family to be found locally, was recorded in two surveys only. Both observations were in the scattered vegetation within the vicinity of the main building structure.

Treecreepers (Climacteridae): White-throated Treecreeper *Cormobates leucophaea* was the only species observed within this family and was recorded in all visits ($n = 11$). Recorded most regularly in the ‘Sclerophyll Slope’ ($n = 9$) survey area, it was also recorded moderately frequently ($n = 5$) throughout the site generally and across all three terrestrial survey areas.

Fairy-wrens (Maluridae): Two of the four wren species observed, being Superb *Malurus cyaneus* and Red-backed Fairy-wrens *M. melanocephalus*, were recorded moderately frequently ($n = 7$ and $n = 6$ respectively) in small family groups averaging four and three respectively.

Honeyeaters (Meliphagidae): A well represented family with 10 species recorded during surveys. Both Lewin’s Honeyeater *Meliphaga lewinii* and Yellow-faced Honeyeaters *Caligavis chrysops* were recorded in all survey visits ($n = 11$) and across all three terrestrial survey areas, with Noisy Miner *Manorina melanocephala* recorded sufficiently to meet residence status ($n = 8$). Lewin’s Honeyeater was recorded in all ‘Sclerophyll Slope’ surveys while Yellow-faced Honeyeater was recorded in all ‘Plantation’ surveys.

Pardalotes (Pardalotidae): Both Spotted Pardalote *Pardalotus punctatus* and Striated Pardalote *P. striatus* were observed at moderate ($n = 7$) or low

($n = 2$) frequency respectively during the surveys. Spotted Pardalote was recorded across all three terrestrial survey areas and generally.

Gerygones, Scrubwrens and Thornbills (Acanthizidae): A reasonably well represented family with eight species recorded, including one, the Large-billed Scrubwren, breeding. Ironically, the only time the Large-billed was recorded was when it was observed feeding a recently fledged Fan-tailed Cuckoo. Yellow Thornbill *Acanthiza nana* was the only species classed as resident ($n = 10$) and although predominantly recorded in the ‘Sclerophyll Slope’ ($n = 8$) survey area, it was also recorded at low levels at both the ‘Trig Station’ ($n = 1$) and ‘Plantation’ ($n = 3$) survey areas and also moderately generally ($n = 6$). Similar to the Yellow Thornbill, but at lower rates, Brown Thornbill *A. pusilla* was recorded across the three terrestrial survey areas and generally.

Figbird and Orioles (Oriolidae): Both Australasian Figbird *Sphecothebes vieilloti* and Olive-backed Oriole *Oriolus sagittatus* were recorded generally in low numbers ($n = 1$ and $n = 2$ respectively).

Shrike-tit (Falcunculidae): Eastern Shrike-tit *Falcunculus frontatus* was recorded twice generally either singularly or as a pair.

Whistlers and Shrike-thrushes (Pachycephalidae): Both Golden Whistler and Grey Shrike-thrush *Colluricincla harmonica* were recorded in all survey visits ($n = 11$). Golden Whistler was recorded across all three terrestrial survey areas and generally, and was also observed breeding.

Whipbird (Psophodidae): The only locally endemic species within the family, Eastern Whipbird *Psophodes olivaceus* is classed as a resident ($n = 10$).

Cuckoo-shrikes and Trillers (Campephagidae): Of the two species observed within this family, Black-faced Cuckoo-shrike *Coracina novaehollandiae* is classed as resident ($n = 9$) while Common Cicadabird *Edolisoma tenuirostris* was only recorded twice generally. On a separate occasion, a flock of more than 70 Black-faced Cuckoo-shrike was observed (C. Stone pers. comm.). It is presumed that this was an aggregation of migrating individuals (Higgins *et. al.* 2006).

Currawongs, Butcherbirds and Woodswallows (Artamidae): Two of the four species of this family, Australian Magpie *Gymnorhina tibicen* and Pied

Butcherbird *Cracticus nigrogularis*, were observed and are considered resident ($n = 11$ and $n = 8$ respectively) within the general site.

Fantails (Rhipiduridae): Of the three species observed, Grey Fantail *Rhipidura albiscapa* was recorded in all survey visits ($n = 11$) and across all three terrestrial survey areas and generally.

Flycatchers and Monarchs (Monarchidae): Magpie-lark *Grallina cyanoleuca* was only recorded moderately ($n = 7$), generally within the site. Considered a summer migrant to the region (Williams 2020), Leaden Flycatcher *Myiagra rubecula* was recorded on five occasions during spring and summer months and is more-than-likely a regular summer migrant to the site.

Crows and Ravens (Corvidae): Classed as a resident species, Torresian Crow *Corvus orru* was recorded in all site visits ($n = 11$).

Robins (Petroicidae): Within the robin family, only Eastern Yellow Robin *Eopsaltria australis* was recorded. Classed as resident ($n = 10$), it was recorded across all three terrestrial areas and generally.

Reed-Warblers (Acrocephalidae): The only species observed within this family, Australian Reed-Warbler *Acrocephalus australis* was recorded during a single survey only.

Songlarks and Grassbirds (Locustellidae): Mostly recorded within the Blady Grass understorey in the 'Trig Station' survey area ($n = 5$), the Tawny Grassbird *Cincloramphus timoriensis* was recorded at medium frequency ($n = 6$). As revegetation matures and shades out the Blady Grass, suitable habitat for this species will decline over time.

Martins and Swallows (Hirundinidae): Represented by two species only, Welcome Swallow *Hirundo neoxena* was recorded as a resident ($n = 8$) predominantly about the main building structure and maintained grass up to the dam wall. Tree Martins *Petrochelidon nigricans* were recorded moderately frequently ($n = 6$) about the main building structure and towards Bootawa Dam Road.

White-eyes (Zosteropidae): The Silvereye *Zosterops lateralis* was recorded at resident status ($n = 9$). Close inspection of the individual birds present during surveys was not undertaken to determine which sub-species occupied the site at various times of the year. It is more-than-likely that a transition of sub-species through the site occurred

rather than a consistent resident year-round population being present.

Starlings and Myna (Sturnidae): Within this family, only a single Common Myna *Acridotheres tristis* was recorded during one survey only. Dominated by remnant and regenerating vegetation over much of the site, the habitat is less suitable for this species, which was observed in greater numbers within surrounding grazing areas.

Mistletoebird (Dicaeidae): The only locally occurring species of this two-species family, Mistletoebird *Dicaeum hirundinaceum* was recorded at low rates ($n = 2$) generally.

Finches (Estrildidae): Only a single finch species, Red-browed Finch *Neochmia temporalis*, was recorded and is considered a resident ($n = 8$). It was observed widely across most survey areas and generally, with an average of 5 (2-9) individuals.

Revegetation plantings have been shown to be productive for avian assemblages (Lindenmayer *et al.* 2012). While the statistical test resulted in no substantive difference between the Trig Station and Plantation survey areas for species, the highly statistical result confirmed field observations of low numbers of individuals utilising the area, predominantly traversing the Plantation between more mature habitats located either side of the area. With the altered plantation management currently practised onsite of slashing between rows only, and not between individual trees, development of a shrub layer between trees should enhance the plantation areas across the Bootawa Dam site.

CONCLUSIONS

The mix of vegetation types present across the Bootawa Dam site provides habitat for a good cross section of avian species. Continued proactive management of the forestry areas and maturing revegetation will provide an ideal island environment within the predominantly cleared grazing landscape over time. These surveys are considered baseline surveys, and further surveys would be encouraged periodically to monitor changes over time, particularly within the maturing revegetation areas.

ACKNOWLEDGEMENTS

Firstly, I would like to thank David Turner for accompanying me on each of the surveys. His visual and

auditory identifications increased the recording rates for the surveys whilst providing companionship during each outing. The Water Services division of MidCoast Council is thanked for approving access to the site to undertake the surveys. A big shout out goes to Craig Stone, one of the dam's staff, who not only gave us our site induction and provided a history of the site, but also received text messages in the early hours of Saturday or Sunday mornings when we checked into the site for our surveys. Acknowledgement is also made of *The Whistler* editors for suggested improvements.

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Appendix. List of bird species recorded during surveys at Bootawa Dam, Bootawa, NSW. This is available on-line at <https://www.hboc.org.au/wp-content/uploads/Bootawa-surveys-Appendix-The-Whistler-Vol-17.pdf>.