

### III. BIRDS OF BENDERING AND WEST BENDERING NATURE RESERVES

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#### INTRODUCTION

The first substantial publication on birds of the eastern wheatbelt was that by Crossman (1909). He published an annotated list of birds of Cumminin Pastoral Lease which includes the present town of Naremben (*ca* 30 km north of the Bending Reserves). Crossman's paper is important because it presents data on birds of the area before clearing for agriculture.

The Cumminin Pastoral Lease of 60,000 acres was granted to Charles Smith in 1860; subsequently the lease changed hands several times (Naremben Historical Society, 1970). Collins brothers, during their leasehold 1896-1900, grew the first wheat in the district. This was to make hay for pack horses en route to the goldfields. Other activity within the area was by sandalwood cutters; the first licences were issued in 1847 but most cutting commenced after 1861.

The first permanent farmer within the area selected a block of 18,962 acres in 1909, the year that the Cumminin Pastoral Lease was cancelled. Other blocks were selected after they were surveyed in 1910. Blocks were gradually taken up throughout the area. There was some reduction in farming during the 1930s, but a big wave of farming commenced after World War II. Now the Shire of Naremben is almost entirely cleared.

Until recently little was known about changes in birds of the southeastern wheatbelt since Crossman's time. Dell and Johnstone (1976) and Dell (1976) discussed birds of Tarin Rock Reserves and Lake Magenta Reserves respectively. They drew attention to the dearth of information published since the paper by Carnaby (1933) on the birds of Lake Grace.

This paper contributes further data on the southeastern wheatbelt by listing birds of the Bending Reserves, *ca* 85 km north of Tarin Rock. The data recorded here were obtained during surveys of Bending Reserve (BR) No. 20338 between 7-12 November 1972 and 19-29 March 1973 and West Bending Reserve (WBR) No. 25681 between 19-27 September 1975 and 23-28 March 1976. The information was obtained by myself except that G. Harold did the September 1975 bird survey. In addition R.E. Johnstone and myself made an overnight visit to WBR on 16-17 April 1973.

Vegetation locations mentioned for BR are from Muir (1977a) and for WBR are from Muir (1977b). Some of the bird surveys occurred before Muir described the vegetation and it was not always possible in retrospect to determine which vegetation associations were occupied by birds. It is expected that further work will take place here on the utilisation by birds of vegetation strata and associations (see Kitchener, 1976).

### ANNOTATED LIST

#### Emu (*Dromaius novaehollandiae*)

Uncommon, BR and WBR. At BR none seen during my surveys but Muir (pers. comm.) has seen single birds and pairs including a large chick in mallee associations. Footprints and scats were noted by me and a dead bird was seen in March. Scats contained seeds of Quondong (*Santalum acuminatum*). At WBR an adult and 3 chicks in woodland WBR loc. 1.8 in September and 2 adults in heath WBR loc. 4.1 in March.

#### Mountain Duck (*Tadorna tadornoides*)

Seasonally common, WBR. Occasional birds in paddocks adjacent to Reserve in September. Muir (pers. comm.) reported about 50 birds occupying nesting hollows in Salmon Gums at WBR loc. 1.1, 1.8 and 1.9 in late June 1976. About 300 were on Kondinin saltlakes in September.

#### Wood Duck (*Chenonetta jubata*)

Uncommon, farmland. Three at dawn on west side of WBR in September.

#### Black-shouldered Kite (*Elanus notatus*)

Scarce, paddocks adjacent to BR and WBR. One 4 km east of BR in March. One near WBR in September and March.

#### Whistling Kite (*Haliastur sphenurus*)

Scarce, WBR. One flying over woodland in November.

#### Brown Goshawk (*Accipiter fasciatus*)

Scarce, WBR. One in woodland WBR loc. 1.14 in November and over heath in September.

#### Wedge-tailed Eagle (*Aquila audax*)

Uncommon, BR and WBR. At BR a pair over Reserve in March. A nest, probably used the previous season, in clump of Salmon Gums (*Eucalyptus*

*salmonophloia*) near BR loc. 2.121 in March. At WBR a pair overhead in November and March and one in woodland WBR loc. 1.3 in September.

#### **Brown Falcon (*Falco berigora*)**

Uncommon, BR and WBR. At BR a single bird seen 4 times in November and 5 times in March. One hunting Painted Quail (*Turnix varia*) coming out of wheat stubble in March. At WBR one seen twice over paddock in September and one over heath WBR loc. 4.1 in March.

#### **Nankeen Kestrel (*Falco cenchroides*)**

Uncommon, BR and WBR. At BR one seen 4 times over burnt areas and adjacent farmland in November. At WBR one over heath WBR loc. 4.4 and 2 over farmland towards Kondinin in September.

#### **Mallee Fowl (*Leipoa ocellata*)**

Common, BR; moderately common WBR. At BR many seen on edges of Reserve, particularly in vicinity of wheat stubble. Birds moved from Reserve into stubble at 1700 hrs and returned to Reserve about 0700 hrs in March. Up to 20 seen each evening, 10 in one paddock. Old nest in *Eucalyptus falcata* mallee in November and active nest in Gimlet (*E. salubris*) and *E. annulata* mallee at BR in March. Remains of bird apparently eaten by fox in March. Active nest in *E. burracoppinensis* scrub BR loc. 2.137 in May 1975 (Muir, pers. comm.). Active nest in shrubland WBR loc. 4.2 in March.

At WBR several moved from woodland WBR loc. 1.12 and 1.14 and mallee WBR loc. 2.15 to feed in wheat stubble in March and November. Pair in heath WBR loc. 4.3 and 1 in mallee WBR loc. 2.9 in September. One in mallee WBR loc. 2.6 and 2 in mallee WBR loc. 2.3 in March. Active nest on old firebreak in heath WBR loc. 4.2 in March.

#### **Painted Quail (*Turnix varia*)**

Uncommon, BR and WBR. At BR several in wheat stubble in March. One flushed from stubble was chased by a Brown Falcon (*Falco berigora*). Dead bird on road 5 km southeast of BR in March. At WBR 3 under *Acacia lasiocalyx* at lithic complex WBR loc. 5.6 in March; feeding scrapes under dense *Casuarina* in shrubland WBR loc. 3.10 in September.

#### **Banded Plover (*Vanellus tricolor*)**

Uncommon, BR and WBR. At BR on edge of burnt area and 5 in wheat stubble in March. At WBR flying over Reserve at night in September.

**Bush Stone-curlew (*Burhinus grallarius*)**

Scarce, WBR. One calling during night in September.

**Common Bronzewing (*Phaps chalcoptera*)**

Moderately common, BR and WBR. On edges of both Reserves particularly near wheat stubble. Up to 12 birds feeding in some paddocks.

**Crested Pigeon (*Ocyphaps lophotes*)**

Uncommon, farmland in vicinity of WBR. A few pairs in September and March.

**Purple-crowned Lorikeet (*Glossopsitta porphyrocephala*)**

Seasonally common, BR and WBR. Flocks of up to 20 birds feeding in flowering Salmon Gums at BR and WBR in March 1973. Several small flocks of up to 5 birds at WBR in September. Not recorded in March 1976 when Salmon Gums were again flowering.

**Galah (*Cacatua roseicapilla*)**

Scarce at BR, uncommon at WBR. Flock of 19 over BR in March. Flock of up to 6 birds in WBR loc. 1.4, 1.8, 1.3 and 1.2 in September, November and March. Not seen at WBR in April.

**Western Rosella (*Platycercus icterotis*)**

Scarce, BR and WBR. Occasional birds on edges and roadsides in each Reserve. Feeding on seeding *Glyschrocaryon flavescens* at BR in November. This plant is common in road verges on BR.

**Port Lincoln Parrot (*Platycercus zonarius*)**

Moderately common, BR and WBR. In all locations with Salmon Gums, Gimlets and York Gums at BR and WBR. Feeds in woodlands, mallee, heaths and farmland. Young just able to fly on 10 November at WBR. Birds investigating nesting hollows at WBR loc. 1.8, 1.3 and 1.2 in March.

**Mulga Parrot (*Platycercus varius*)**

Uncommon, BR and WBR. Three pairs on edge of oat crop in November and 6 feeding on ground in same paddock at BR in March. Two on roadside in loc. 2.6 at WBR in September.

**Elegant Parrot (*Neophema elegans*)**

Moderately common, BR and WBR. Feeding in paddocks each time the Reserves were visited. Birds flying into nesting spout 12 m from ground in

Salmon Gum at WBR loc. 1.9 on 12 November. Several flocks of more than 10 birds totalling about 100 were feeding in burnt heath at BR loc. 2.110 in late May 1975 (Muir, pers. comm.).

**Boobook Owl (*Ninox novaeseelandiae*)**

Scarce, WBR. Single birds calling in woodland WBR loc. 1.8 and 1.4 in September and 2 on track at night. One calling in woodland in WBR loc. 1.8 in March.

**Barn Owl (*Tyto alba*)**

Scarce, WBR. One on road on east boundary of WBR in September. One calling in woodland WBR loc. 1.8 in March.

**Tawny Frogmouth (*Podargus strigoides*)**

WBR. One calling in woodland WBR loc. 1.8 in September, and 1 seen by B.G. Muir in shrubland WBR loc. 3.10 in June 1976.

**Crested Owlet-nightjar (*Aegotheles cristatus*)**

Uncommon, BR and WBR. Pair calling each night in BR loc. 1.23 near breakaway in March. One calling over heath WBR loc. 4.6 in September and one or more calling in woodland WBR loc. 1.8 in March.

**Spotted Nightjar (*Eurostopodus guttatus*)**

Scarce, BR. One seen while spotlighting over burnt heath near BR loc. 4.15 in November.

**Pallid Cuckoo (*Cuculus pallidus*)**

Scarce. One at Kondinin saltlakes in September.

**Fan-tailed Cuckoo (*Cuculus flabelliformis*)**

Scarce, WBR. Single bird calling in woodland WBR loc. 1.8 in September.

**Horsfield Bronze Cuckoo (*Chrysococcyx basalidis*)**

Scarce, WBR. Two calling in September.

**Sacred Kingfisher (*Halcyon sancta*)**

Scarce, WBR. One in lithic complex WBR loc. 5.6 in September.

**Black-tailed Bee-eater (*Merops ornatus*)**

Seasonal, BR and WBR. Several over both Reserves in November and flock flying north over BR on 21 March. Freshly excavated burrow on track on WBR loc. 1.8 on 12 November.

**White-backed Swallow (*Cheramoeca leucosterna*)**

Scarce, BR and WBR. Single bird seen twice over BR in March. About 10 occupying burrows in sandpit at WBR loc. 4.2 in September and March.

**Welcome Swallow (*Hirundo neoxena*)**

Scarce, BR. Pair flying south over BR on 27 March. Pair feeding young in nest in farm shed 0.5 km northwest of BR on 8 November. Several at Kondinin in March and September.

**Tree Martin (*Hirundo nigricans*)**

Moderately common, BR and WBR. Groups of up to 6 over BR and WBR in March, September and November. Pair carrying nest material into fissure 15 m from ground in Salmon Gum in WBR loc. 1.9 on 9 November. Another pair was attempting to usurp this nesting site.

**Australian Pipit (*Anthus novaeseelandiae australis*)**

Moderately common on edges of Reserves and adjacent paddocks.

**Black-faced Cuckoo-shrike (*Coracina novaehollandiae*)**

Uncommon, BR and WBR. One flying north over BR and WBR in March. Single birds in WBR in November and single birds at WBR loc. 2.9 and 1.14 in September.

**White-winged Triller (*Lalage sueurii*)**

Scarce, BR and WBR. Male in burnt area of BR feeding among regenerating seedlings on 10 November. Two at lithic complex WBR loc. 5.8 on 20 September, and 12 at Kondinin saltlakes on 26 September may have been in transit.

**Southern Scrub-robin (*Drymodes brunneopygius*)**

Common, BR and WBR. Widespread at BR in most vegetation formations examined except woodlands without understories and heaths below 1 m tall. Similarly widespread at WBR but not in heaths less than 1 m tall or woodland and mallee with no distinct understory.

**Chestnut Quail-thrush (*Cinclosoma castanotum*)**

Scarce, BR. One in ecotone between BR loc. 2.86 and 3.27 in November and a male trapped there in March.

**White-browed Babbler (*Pomatostomus superciliosus*)**

Uncommon, BR and WBR. Three groups of up to 4 birds in thickets at

BR loc. 3.14 and 3.17; 3 old nests in *Casuarina acutivalvis*. Four in woodland WBR loc. 1.9 and 4 in WBR loc. 1.3. Several groups in road verges between Reserves.

**Brown Songlark (*Cincloramphus cruralis*)**

Scarce, paddocks. One giving display flight over paddock on west side of BR on 8 November. One calling in paddock on east side of WBR on 22 September.

**Blue-breasted Wren (*Malurus pulcherrimus*)**

Moderately common, BR and WBR. Groups of up to 4 birds in heath taller than 1 m, in shrublands and in mallee with distinct understories at BR and WBR. Female carrying nest material at BR loc. 2.107 on 9 November.

**Southern Emu-wren (*Stipiturus malachurus*)**

Scarce, BR and WBR. Three in heath at BR loc. 2.137 in March and 4 in heath at WBR loc. 4.4 in March.

**Broad-tailed Thornbill (*Acanthiza pusilla apicalis*)**

Common, BR and WBR. Single birds and pairs in all formations except Salmon Gum woodland and heath below 1 m tall.

**Chestnut-rumped Thornbill (*Acanthiza uropygialis*)**

Moderately common, WBR. Groups of up to 4 birds in woodland, mallee with no distinct understory and lithic complexes during each survey.

**Yellow-rumped Thornbill (*Acanthiza chrysorrhoa*)**

Uncommon, WBR. Several groups of up to 5 birds in woodland WBR loc. 1.8 and 1.9 in November and April; 10 in WBR loc. 2.9 in September; 4 in road verge 1 km west of WBR in March.

**Spotted Scrub-wren (*Sericornis frontalis maculatus*)**

Uncommon, BR and WBR. Four pairs in dense understories under mallee at BR in November and March. Several pairs in dense vegetation in lithic complexes at WBR in September and March.

**Redthroat (*Pyrrholaemus brunneus*)**

Moderately common, BR and WBR. In lithic complexes and woodlands.

**Western Warbler (*Gerygone fusca*)**

Scarce, WBR. Two in woodland WBR loc. 1.5 in September.

**Weebill (*Smicrornis brevirostris*)**

Common, BR and WBR. In eucalypts at both Reserves. Similar status on all visits.

**Shy Ground-wren (*Hylacola cauta*)**

Moderately common at BR; uncommon at WBR. Widespread in mallee at BR. Adult feeding young near BR loc. 2.107 on 10 November. One in mallee at WBR in March 1976.

**Field Wren (*Calamanthus fuliginosus*)**

Status uncertain, BR and WBR. Single birds seen 4 times in heath less than 1 m tall at BR loc. 4.7, 2.137 and 4.24 in March. Calling in heath at WBR loc. 4.6 and 4.4 in March.

**White-fronted Chat (*Epthianura albifrons*)**

Uncommon, edges of BR and WBR. Four on edge of BR adjacent to paddock in November and 3 in March. Nest with 3 eggs, brooded by male, in heath at BR loc. 2.164 on 9 November. Several on edges of paddocks and several flying over heath at WBR loc. 4.6 and 4.5 in September and March.

**Brown Flycatcher (*Microeca leucophaea*)**

Scarce, BR. One in Salmon Gum woodland BR loc. 1.18 in burnt area in March.

**Red-capped Robin (*Petroica goodenovii*)**

Uncommon, BR; moderately common, WBR. Male in burnt area and male 1 km northwest of BR in March. Pairs throughout lithic complexes at WBR in March, September and November. Pair in woodland WBR loc. 1.8 in November.

**Western Yellow Robin (*Eopsaltria australis griseogularis*)**

Uncommon, BR. Several pairs in woodland and mallee in BR loc. 1.1, 2.3 and 2.95. Birds fighting on 21 March.

**Willie Wagtail (*Rhipidura leucophrys*)**

Uncommon, BR and WBR. Several on edges of Reserves, in road verges and farm paddocks each time the area was visited. Pair building nest in farm shed 0.5 km northwest of BR on 8 November.

**Grey Fantail (*Rhipidura fuliginosa*)**

Scarce, WBR. Two single birds in woodland in September.



**Restless Flycatcher (*Myiagra inquieta*)**

Scarce, WBR. One in woodland WBR loc. 1.9 in April.

**Golden Whistler (*Pachycephala pectoralis*)**

Moderately common, BR and WBR. In mallee and shrubland formations taller than 2 m at both Reserves on all visits.

**Rufous Whistler (*Pachycephala rufiventris*)**

Uncommon, WBR. Six sightings of single birds in woodland at WBR loc. 1.8 and 1.9 and lithic complexes WBR loc. 5.8, 5.9 and 5.6 in November.

**Western Shrike-thrush (*Colluricincla harmonica rufiventris*)**

Moderately common, BR and WBR. In woodlands, mallee and shrublands more than 2 m tall.

**Crested Bellbird (*Oreoica gutturalis*)**

Moderately common, BR and WBR. In heaths and shrublands.

**Black-capped Sittella (*Neositta chrysoptera pileata*)**

Uncommon, WBR. Eight in woodland WBR loc. 1.8 in March.

**Western Silvereye (*Zosterops lateralis gouldi*)**

Uncommon, WBR. Several pairs in woodland WBR loc. 1.3 in March 1976.

**Red-tipped Pardalote (*Pardalotus striatus substriatus*)**

Moderately common, BR and WBR. Throughout eucalypts in both Reserves in November. Pair carrying grass to nest about 15 m from ground in Salmon Gum at WBR loc. 1.9 on 12 November. Several groups giving migratory calls were flying north in March. Several present in woodland at WBR in April and September.

**Brown Honeyeater (*Lichmera indistincta*)**

Seasonal, BR and WBR. Widespread in BR and WBR in November. None recorded in March 1973. Widespread in heaths and lithic complexes at WBR in September and several in flowering mallee at WBR loc. 2.6 in March 1976.

**Singing Honeyeater (*Meliphaga virescens*)**

Uncommon, BR and WBR. Several in flowering *Grevillea eriostachya* at BR loc. 4.27, 2.164 and 2.165 and WBR loc. 4.2 in November. Several in flowering Salmon Gums at BR loc. 1.8 and WBR loc. 1.8 and in mallee at

WBR in March 1973. Several in lithic complexes at WBR in September and March 1976.

**Purple-gaped Honeyeater (*Meliphaga cratitia*)**

Uncommon, BR and WBR. About 10 in woodland BR loc. 1.8 in March 1973 and several in mallee BR loc. 2.151 in March 1976. Several in mallee at WBR loc. 2.9 and 2.6 in March 1976; some were feeding in flowering *Eucalyptus pileata*.

**White-eared Honeyeater (*Meliphaga leucotis*)**

Common, BR and WBR. Widespread throughout mallee, woodland and shrubland more than 2 m tall.

**Brown-headed Honeyeater (*Melithreptus brevirostris*)**

Moderately common, BR and WBR. Flocks of up to 10 birds in mallee and woodland at BR and WBR in November, March and September. Flock of 20 in flowering mallee at WBR loc. 2.6 in March 1976.

**Tawny-crowned Honeyeater (*Phylidonyris melanops*)**

Uncommon, BR and WBR. Three pairs and 2 single birds in heath and mallee at BR loc. 4.27, 2.164 and 2.165 on 10 November and 1 at BR loc. 4.27 on 20 March. Several in heath at WBR loc. 4.5 and 4.6 in September and 2 in canopies of flowering Salmon Gums at WBR loc. 1.8 in March 1976.

**White-cheeked Honeyeater (*Phylidonyris niger*)**

Uncommon, WBR. About 10 in heath at WBR loc. 4.5 in September and March and 6 in heath at WBR loc. 4.3 in March.

**Yellow-throated Miner (*Manorina flavigula*)**

Uncommon. One at Kondinin in September.

**Spiny-cheeked Honeyeater (*Acanthagenys rufogularis*)**

Scarce, WBR. In lithic complexes, 1 in WBR loc. 5.7 in September and 1 in WBR loc. 5.6 in March.

**Red-Wattle-bird (*Anthochaera carunculata*)**

Uncommon, BR and WBR. Pairs and single birds scattered throughout flowering mallee and Salmon Gums at BR and WBR in November and March. Several in flowering mallee and in woodland at WBR in September. Calling at Kondinin in March 1973.

**Magpie-lark (*Grallina cyanoleuca*)**

Uncommon, WBR and farmland. Occasional birds in road verges and paddocks during each visit and 2 in woodland WBR loc. 1.8 in April.

**Masked Wood-swallow (*Artamus personatus*)**

Scarce, BR. About 100 flying southeast over BR on 10 November.

**Black-faced Wood-swallow (*Artamus cinereus*)**

Moderately common, edges of BR and WBR and in paddocks. Similar status each time the area was visited. One carrying nest material at BR on 8 November.

**Grey Currawong (*Strepera versicolor*)**

Moderately common, BR and WBR. Pairs or single birds throughout all vegetation formations more than about 3 m tall.

**Grey Butcher-bird (*Cracticus torquatus*)**

Uncommon, BR and WBR. Two single birds in mallee at BR in November and 4 in March. Two in woodland WBR loc. 1.8 in April and 1 in WBR loc. 1.14, 2.16 and 5.1 in September.

**Pied Butcher-bird (*Cracticus nigrogularis*)**

Scarce, WBR. One in woodland WBR loc. 1.8 in March. One at Kondinin in March.

**Western Magpie (*Cracticus tibicen dorsalis*)**

Moderately common, BR and WBR. On edges of Reserves, mainly feeding in paddocks. Roosting and sheltering in mallee and woodlands on edges of Reserves. Three young, barely flying, at BR on 8 November. One flock in stubble in March contained 24 birds.

**Australian Raven (*Corvus coronoides*)**

Moderately common, BR and WBR. Pairs and groups of up to 4 birds in woodlands at both Reserves during all visits. Widespread in road verges and farm country. More common in March 1973 when aggregations of up to 100 birds were drinking at farm dams.

**Little Crow (*Corvus bennetti*)**

Uncommon, farmland. Groups of up to 50 birds near farm dams in November. About 40 near WBR in March 1976.

## DISCUSSION

Surveys of Bending Reserves recorded 55 species at BR, 73 at WBR and 6 in adjacent farmlands. The total was 85 species, which is slightly less than the 88 species recorded at Tarin Rock reserves (Dell & Johnstone 1976) 85 km to the south. Of the birds recorded at Tarin Rock, 17 were not found at Bending; and of those found at Bending 14 were not found at Tarin Rock.

The species found only at Tarin Rock were Black Duck, Grey Teal, Square-tailed Kite, Collared Sparrowhawk, Little Falcon, Peregrine Falcon, Little Quail, White-tailed Black Cockatoo, Smoker Parrot, Golden Bronze Cuckoo, Scarlet Robin, Hooded Robin, Spotted Pardalote, Yellow-plumed Honeyeater, New Holland Honeyeater, Zebra Finch and Dusky Woodswallow. Those found only at Bending Reserves were Black-shouldered Kite, Whistling Kite, Brown Goshawk, Painted Quail, Bush Stone-curlew, Crested Pigeon, Mulga Parrot, Black-tailed Bee-eater, White-backed Swallow, Chestnut Quail-thrush, Brown Songlark, Redthroat, Spiny-cheeked Honeyeater and Pied Butcherbird.

Most birds in the list above are not resident in the southeastern wheatbelt. Some are seasonal in the wheatbelt, and some are migrants. Others are so infrequently recorded as to preclude any assessment of their status; the only ones likely to be resident are Painted Quail, Chestnut Quail-thrust and Redthroat. Two of these are scarce in the southeastern wheatbelt, and Dell (1976) has already discussed aspects of the distribution of the Redthroat.

It appears that Bending and Tarin Rock reserves have a very similar assemblage of resident birds. It is interesting to compare the area of different vegetation formations in the two groups of reserves. Muir (1977b) provides percentages and total areas of the formations at Bending reserves, and Muir (1976) provides similar figures for Tarin Rock reserves. The figures show considerable differences. For example, Tarin Rock reserves and adjoining contiguous land have 82% mallee, 15% woodland and small amounts of shrubland and heath. Bending reserves have 65% mallee, 6% woodland, 6% shrubland, 12% heath, 5% lithic complex and 2% breakaways.

Despite the major differences in vegetation listed above, the avifauna on the two groups of reserves is similar. This is because the same formations are present in both areas even though the percentages are dissimilar.

The two Bending reserves have very different proportions of vegetation formations. BR is relatively uniform with 81% mallee compared to WBR which has five formations of roughly equal proportions (Muir 1977b).

The amount of woodland and lithic complex on WBR is reflected in the birds present on each Reserve. BR has 17 fewer species than WBR, namely Whistling Kite, Brown Goshawk, Mountain Duck, Boobook Owl, Barn Owl, Tawny Frogmouth, Fantailed Cuckoo, Chestnut-rumped Thornbill, Yellow-rumped Thornbill, Western Warbler, Grey Fantail, Rufous Whistler, Black-capped Sitella, Magpie-lark and Pied Butcherbird, which were all recorded in woodland at WBR. In addition Galah and Red-capped Robin were much more common at WBR than at BR. It is possible that Galahs were not resident on BR but visited the area for feeding.

Muir (1977b) has attempted to quantify association diversity and postulated that WBR may have 3 times the diversity of BR, although BR has twice as many associations. This is because WBR is only a third the size of BR but has 1.69 associations per km<sup>2</sup> compared to 0.25 for BR.

This different diversity is reflected in the birds recorded. The figures below show the number of species recorded in each basic formation type. They are divided into resident and non-resident species. Information obtained elsewhere in the wheatbelt helped in assessing resident status.

	WBR	BR
Total number of bird species	73	55
Total number resident	40	37
Total number in woodland	21	14
Resident birds in woodland	18	13
Total number in mallee	25	26
Resident birds in mallee	19	18
Total number in shrubland	16	17+
Resident birds in shrubland	10	data incomplete
Total number in heath	17	16
Resident birds in heath	10	9
Total number in lithic complexes	21	13
Resident birds in lithic complexes	10	7
Birds using hollow trees — non-resident	11	7
Birds using hollow trees — resident	4	3

It appears from the above figures that the amount of woodland on WBR is important. WBR has approximately twice as much woodland as BR and has 50% more bird species. WBR has only about 6% as much mallee as BR but has approximately the same number of mallee birds. Although BR has three times as many mallee associations as WBR the difference in structural types is much less. It is possible that birds occupy mallee regardless of the

species or association physiognomy. It is also likely that the areas of each basic formation type on WBR are sufficiently large to maintain their characteristic assemblage of birds. Conversely, on BR it seems that the areas of woodland and lithic complexes are too small to maintain their assemblage of birds, as they have less species of birds than are found in similar formations twice their size on WBR.

Dell and Johnstone (1976) pointed out that we must examine both vegetation formations and floristics to interpret bird distributions in the wheatbelt and that broad vegetation formations are a poor guide to distribution in these semi-arid areas. Basic formation types might be useful in assessing bird distributions particularly in areas with large homogeneous formations such as coastal sandplains, e.g. Cockleshell Gully Reserve (Dell & Johnstone 1977) but are of limited use in interpreting bird distributions in the wheatbelt. They are useful, however, in outlining assemblages in particular parts of the wheatbelt such as the Bending Reserves. In our final synthesis on wheatbelt birds we will interpret distributions by using data on vegetation formations, associations and floristics and other groupings as later selected.

Muir (1977b) has discussed differences in the senescence of woodlands on the two Reserves and concludes that this factor may be important for breeding birds. His figures show that there are about 10 times as many senescent trees per unit area on WBR than BR and there is twice the area of woodland on WBR as on BR. Unfortunately there are few data on breeding either on BR or WBR but figures given at the beginning of this discussion indicate that there are several woodland birds found only on WBR.

The 85 species of birds recorded at the Bending Reserves is compared to 86 species recorded by Crossman (1909) at Cumminin Station (now Narembeen, see Introduction, this paper). Twenty-eight species recorded by Crossman were not noted during my surveys; and 28 recorded by me were not listed by Crossman.

Only 35% of species are common to both lists. Crossman's list of 89 species contains only 86 after eliminating 3 errors. The Yellow-spotted Bower-bird (*Chlamydera guttata*) is erroneous; and Brown Falcon (*Falco berigora*) and Grey Butcher-bird (*Cracticus torquatus*) are listed twice.

Species recorded by Crossman (*ibid.*) and not by me are: Stubble Quail (*Coturnix novaehollandiae*), Black-tailed Native-hen (*Gallinula ventralis*), Dusky Moorhen (*G. tenebrosa*), Australian Bustard (*Otis australis*), Straw-necked Ibis (*Threskiornis spinicollis*), White-necked Heron (*Ardea pacifica*), White-faced Heron (*A. novaehollandiae*), Grey Teal (*Anas gibberifrons*),

Spotted Harrier (*Circus assimilis*), Peregrine Falcon (*Falco peregrinus*), Little Falcon (*F. longipennis*), Collared Sparrowhawk (*Accipiter cirrocephalus*), White-tailed Black Cockatoo (*Calyptorhynchus baudinii*), Budgerygah (*Melopsittacus undulatus*), Red-backed Kingfisher (*Halcyon pyrrhopygia*), Fairy Martin (*Hirundo ariel*), Hooded Robin (*Petroica cucullata*), Ground Cuckoo-shrike (*Coracina maxima*), White-winged Wren (*Malurus leucopterus*), Western Grass-wren (*Amytornis textilis*), Shrike-tit (*Falcunculus frontatus*), Gilbert Whistler (*Pachycephala inornata*), Rufous Tree-creeper (*Climacteris rufa*), White-fronted Honeyeater (*Phylidonyris albifrons*), Yellow-plumed Honeyeater (*Meliphaga ornata*), Little Wattle-bird (*Anthochaera chrysoptera*), Zebra Finch (*Poephila guttata*), and Dusky Wood-swallow (*Artamus cyanopterus*).

Species recorded by me but not by Crossman (*ibid.*) are: Black-shouldered Kite (for scientific names see Annotated List), Whistling Kite, Brown Goshawk, Wood Duck, Painted Quail, Crested Pigeon, Purple-crowned Lorikeet, Galah, Mulga Parrot, Elegant Parrot, Barn Owl, Crested Owlet-nightjar, Spotted Nightjar, Horsfield Bronze Cuckoo, Southern Scrub-robin, Southern Emu-wren, Chestnut-rumped Thornbill, Spotted Scrub-wren, Western Warbler, Shy Ground-wren, Field Wren, Golden Whistler, Rufous Whistler, Brown Honeyeater, Purple-gaped Honeyeater, Tawny-crowned Honeyeater, White-cheeked Honeyeater and Little Crow.

Many of the differences between the lists are not unexpected. Crossman's area contained habitat not found at the Bending Reserves. For example it included 'a chain of lakes some of which have a considerable amount of water in wet seasons, and are the haunts of innumerable ducks'. Surprisingly Crossman did not record Wood Duck, and Mountain Duck was apparently scarce even on the lakes. Both these species are likely to have increased as a result of clearing and provision of dams.

The Australian Bustard, Hooded Robin, Ground Cuckoo-shrike, Western Grass-wren, Shrike-tit, Gilbert Whistler, Rufous Tree-creeper, Yellow-plumed Honeyeater and Dusky Wood-swallow have declined markedly with clearing and are now only rarely recorded in the wheatbelt.

My list contains species which have apparently moved into the area since clearing. Crested Pigeon and Galah are known to have followed the planting of cereal crops; Mulga Parrot and Elegant Parrot may have done so as well. Purple-crowned Lorikeet, Brown Honeyeater, Purple-gaped Honeyeater, Tawny-crowned Honeyeater and White-cheeked Honeyeater follow plant flowering and may have been overlooked by Crossman.

Crossman did not record Painted Quail, Crested Owlet-nightjar, Spotted Nightjar, Southern Scrub-robin, Southern Emu-wren, Chestnut-rumped Thornbill, Spotted Scrub-wren, Shy Ground-wren, Field Wren, Golden Whistler and Rufous Whistler. I believe these species are sedentary and unlikely to have moved into the area since clearing. Some of them may have been overlooked by Crossman who acknowledged that some species were not sufficiently identified and were omitted from his list. However the absence of Golden and Rufous Whistlers is intriguing as these species are difficult to overlook.

In conclusion, the birds of the Bendering area have changed considerably since clearing. However, except for a few species including Chestnut Quail-thrush and Painted Quail, the birds are likely to survive long-term on either or both Reserves because habitat is sufficiently close (*ca* 6 km apart), and there are two fairly good road verges, to allow a large number of species to move between Reserves. Provided these corridors are maintained, this will prevent the Reserves from becoming separate islands.