# Bush bird Monitoring

## in Barmah-Millewa Forest

## 1999 to 2017

Australian Government | MURRAY–DARLING BASIN AUTHORITY | NSW GOVERNMENT Office of Environment & Heritage NSW National Parks & Wildlife Service

**Report Title:** Bush Bird Monitoring within Barmah-Millewa Forest 2016-2017

**Author:** Ali Borrell, National Parks and Wildlife

**Report prepared for:** Murray Darling Basin Authority, as part of the Living Murray Condition Monitoring Program.

**Front cover photo:** Bush bird monitoring plot, Tongalong Ridge (spring 2016) – Ali Borrell



**Contact us**

Inquiries regarding the licence and any use of the document are welcome at:

NSW National Parks and Wildlife Service
23 Neil St, Moama
03 5483 9100

*Acknowledgements.*

This project was funded by The Living Murray (MD3090-2). The Living Murray is a joint initiative funded by the New South Wales, Victorian, South Australian, Australian Capital Territory and Commonwealth governments, coordinated by the Murray–Darling Basin Authority.

# Summary

The Barmah-Millewa Forest bush bird surveys in 2016-17 identified a total of 61 woodland bird species in the survey plots. Species were recorded from both the survey plots and the adjoining habitat. There were 1221 individual birds recorded from across twenty sites in the Barmah-Millewa Forest.

- Eight declining species within the temperate agricultural zone of southern Australia (Reid, 1999) were recorded through the year (brown treecreeper *Climacteris picumnus*, rufous whistler *Pachycephala rufiventris*, dusky woodswallow *Artamus cyanopterus*, jacky winter *Microeca fascinans*, red-capped robin *Petroica goodenovii,* restless flycatcher *Myiagra inequita*, hooded robin *Melanodryas cucullate* and white-browed babbler *Pomatostomus superciliosus*).
- Five vulnerable/significant species (NSW *Threatened Species Conservation Act* [TSC Act] 1995, Victoria DSE 2013) were recorded during the current surveys: superb parrot *Polytelis swainsonii*, flame robin *Petroica phoenicea,* hooded robin *Melanodryas cucullata,* scarlet robin *Petroica boodang* and dusky woodswallow *Artarmus cyanopterus.* The superb parrot is also listed as vulnerable under the *Environment Protection and Biodiversity Conservation Act* 1999.
- The most common species recorded were weebill *Smicrornis brevirostris*, white-plumed honeyeater *Lichenstomus penicillatus* and brown treecreeper.
- Icon site condition assessment scores indicate that forest health has improved or been maintained in river red gum habitat whilst sandhill and box habitats recorded a decline in condition since 2015-16.

# 1. Introduction

A baseline monitoring survey of bush birds (1999-2002) was undertaken between 1999 and 2004 (Webster 2004a, b). Follow-up seasonal surveys were conducted during 2008, 2010, 2011/12, 2012/13, 2015-16 (Webster 2008a, b, c, d, 2010a, b, c, d, OEH 2012a, b, c, 2013, 2016). The current year of surveys were undertaken as part of the ongoing condition monitoring program within Barmah-Millewa Forest – a Living Murray icon site. To date, 607 20-minute surveys have been conducted as part of this project.

The surveys aim to monitor bush bird assemblages to provide information on species richness and relative abundance. This information can potentially be used to identify changes in bird assemblages in the forest over time. Indices have been created by Wayne Robinson of CSU University using the data, and scores have been calculated to show changes in condition over time.

This report presents an overview of the 2016-17 monitoring results and a brief discussion on observational trends in bush bird diversity and abundance within the Barmah-Millewa Forest icon site.

# 2. Methods

## Census Methodology

Twenty woodland bird monitoring sites were established within the Barmah-Millewa Forest (Figure 1) in 1999, in conjunction with the Forestry Corporation of NSW (formerly Forests NSW) and the Victorian Department of Environment, Lands, Water and Planning (DELWP) (formerly Department of Sustainability and Environment). Sites where selected to represent the following habitat types:

- River red gum (*Eucalyptus camaldulensis*) Site Quality 1
- River red gum Site Quality 2
- River red gum Site Quality 3
- Box woodlands (western grey box *E. microcarpa*, yellow box *E. melliodora*)
- Sandhills (includes river red gum [1], box/pine (*Callitris* sp.) [2], box [1])

These sites were also selected based on accessibility during major floods, and in New South Wales, previous fauna surveys.

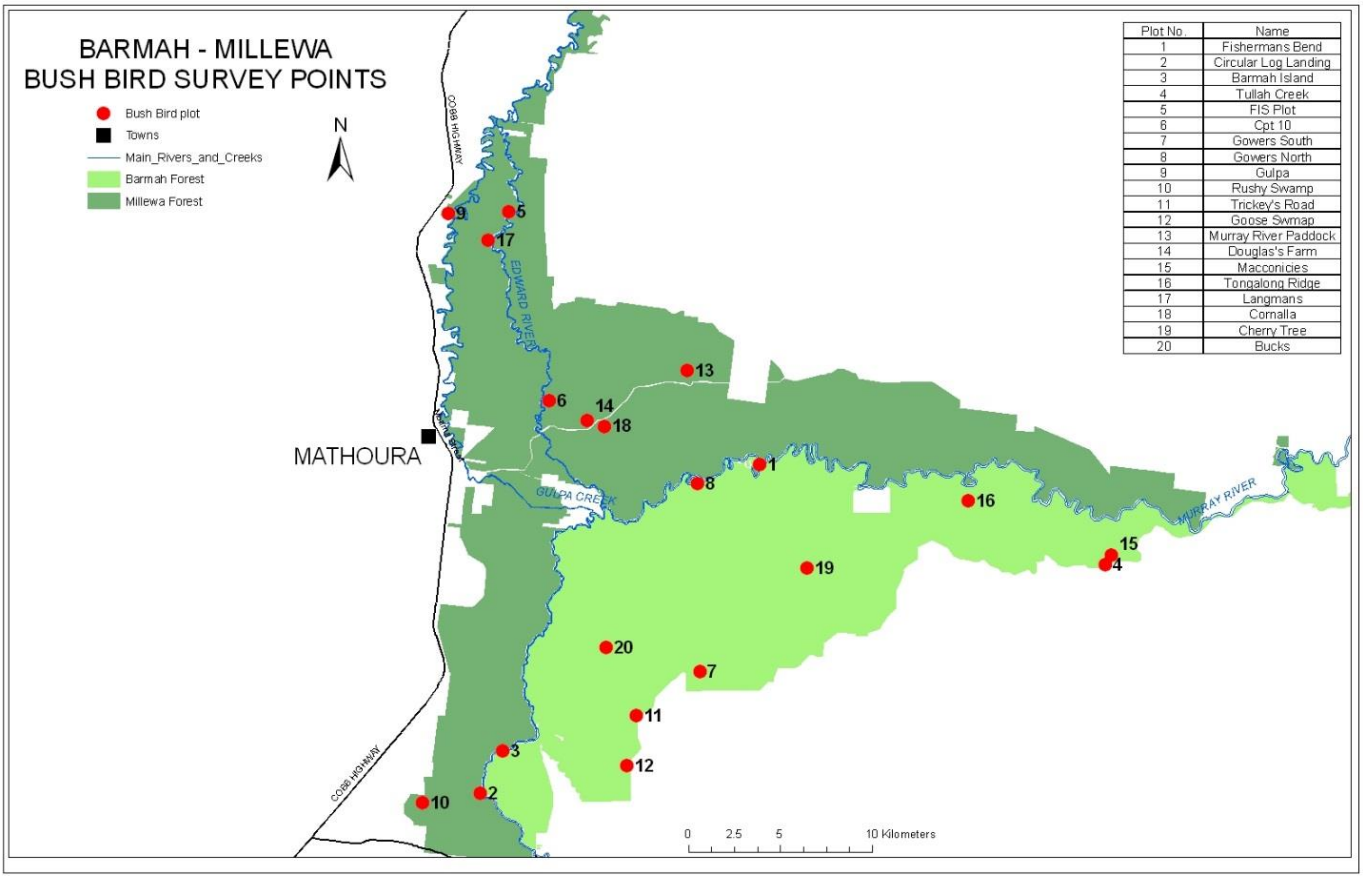


***Figure 1**: Location of bush bird monitoring sites within the Barmah-Millewa Forest icon site.*

Across the five habitat types, 2-hectare plots were established in both the Murray Valley National Park (NSW) and in Barmah National Park (Vic). Surveys at each plot are carried out for twenty minutes and are repeated once each season. During the twenty-minute survey all birds observed or heard on the plot are recorded. Birds seen or heard outside of the plot are recorded as being present within that habitat type, if the observer was confident that this was the case. Birds flying over or through the plot were recorded as on the plot only if they were species that utilise the air space to forage for food (e.g. brown goshawk *Accipiter fasicatus*, tree martin *Hirundo nigricans*).

In the event of excessively windy weather (i.e. crowns of the trees moved violently) or rain, surveys were not undertaken. Each plot was visited either prior to 9am (early) or between 9am and 12pm (late). This ensures all counts are completed by 12:20pm. Early and late sessions alternate across the four seasons at each site, to minimise potential bias in the results.

No nocturnal bird surveys are undertaken as part of this project. There were also no targeted surveys undertaken for significant, rare or threatened species.

## 2.2 Data Interpretation

The review of condition monitoring programs for icon sites in the Living Murray (TLM) initiative resulted in the development of a set of key outcome descriptions for refined components. The aim of the outcome descriptions was to determine icon site condition through evaluating parameters. Barmah-Millewa has a set of bush bird data that has been collected across seventeen years.

The objective adopted by the project was that overall health or condition of floodplain and non-floodplain woodland habitats within Barmah-Millewa Forest would be reflected by healthy woodland bird populations (Robinson, 2014b). Three parameters were used in developing the Icon Site Condition Assessment (ISCA). The score aims to reflect the richness of the Victorian temperate Woodland Bird Community (VWBC), the extent of VWBC species and total species richness.

The VWBC species list was extracted from the Flora and Fauna Guarantee and includes woodland dependant and woodland associated bird species (Appendix ). The VWBC index has been viewed as a truer indicator of bush bird community health, as it only considers species that are reliant on temperate woodlands, and not species which actively utilise other habitats.

Using these indices, icon site condition assessment scores were developed for all site types in the Barmah-Millewa condition monitoring program (Table 1). The reference scores are based on the 90$^{th}$ percentile species richness for the year. The scores show species diversity over time, and reflect changes in forest condition from year to year. The initial scores were calculated using three years of data that was suitable for analysis. Since the initial analysis, extra data was made available for analysis and this has now been added to produce scores which reflect bush bird assemblages in the five different habitat types. Scores were recalculated from 2015-16 (see 2015-16 Bush bird Condition Monitoring Report), and have changed due to the increase in sites included and a refined method of calculation.

| Habitat | Number of Sites in Database | 90$^{th}$ percentile total species richness | 90$^{th}$ percentile VWBC species richness |
|---|---|---|---|
| BOX | 118 | 11 | 4 |
| RRGQ1 | 118 | 9 | 2 |
| RRGQ2 | 112 | 9 | 3 |
| RRGQ3 | 115 | 9 | 3 |
| SANDH | 114 | 10 | 3 |

***Table 1:*** *Updated Icon-Site Indices, additional data was added to the analysis added from a larger number of surveys.*

# 3. Results

A total of 61 species was recorded in 2016-17. The surveys were conducted across four seasons (Table 2). 1 additional species was recorded in the adjoining habitat. Several migratory species to the region were recorded such as the rufous whistler, sacred kingfisher and olive-backed oriole. Eight species that have been identified as declining were recorded. These were brown treecreeper, rufous whistler, dusky wood swallow, jacky winter, red-capped robin, restless flycatcher, hooded robin and white-browed babbler. The three most common birds identified across the surveys were the weebill, white-plumed honeyeater and brown treecreeper (Table 4).

| Season | Date Surveyed | Individuals Counted | Species Recorded | Listed Species | Notes |
|---|---|---|---|---|---|
| Spring | 2 – 30th November | 146 | 42 | 1([5]) | Only ten out of the twenty sites surveyed due to flooding. |
| Summer | 17 – 22nd January | 385 | 50 | 3 ([2] [3] [4]) | One site unable to be surveyed |
| Autumn | 13 – 30th April | 311 | 34 | 1 ([3]) | |
| Winter | 23rd June – 11th July | 340 | 40 | 2 ([1] [2] [3]) | 1 additional species recorded in adjoining habitat |

***Table 2**: [1] Flame Robin (Vulnerable, NSW), [2] Scarlet Robin (Vulnerable, NSW), [3] Dusky Wood swallow (Vulnerable, NSW, [4] Hooded Robin (Vulnerable, EPBC Act, Near Threatened VIC DSE 13), [5] Superb Parrot (Vulnerable, NSW). All data can be viewed in Appendix 1.*

| Site | Sites Flooded in Spring 2016 |
|---|---|
| Box | 0 out of 4 |
| Red Gum Site Quality 1 | 4 out of 4 |
| Red Gum Site Quality 2 | 3 out of 4 |
| Red Gum Site Quality 3 | 4 out of 4 |
| Sandhill | 0 out of 4 |

*Table 3: Number of sites that experienced inundation in the 2016 spring flood period, with some inundation preventing access.*

| Common name | Reporting Rate (%) | Abundance | Guild |
|---|---|---|---|
| Weebill | 44 | 3.1 | Canopy: Invertebrates |
| Brown Treecreeper | 41 | 2.6 | Trunks/Branches: Invertebrates |
| White-plumed Honeyeater | 41 | 4.5 | All Levels: Nectar |
| Striated Pardalote | 33 | 1.8 | Canopy: Invertebrates |
| White-throated Treecreeper | 30 | 1.6 | Trunks/Branches: Invertebrates |
| Buff-rumped Thornbill | 26 | 1.6 | Low: Invertebrates |
| Grey Fantail | 26 | 1.1 | Perch Aerial Feeders |
| Superb Fairy Wren | 26 | 3.1 | Low: Invertebrates |
| Yellow Rosella | 26 | 2.3 | All Levels: Seed and Fruit |
| Rufous Whistler | 23 | 1.5 | Canopy: Invertebrates |
| Jacky Winter | 20 | 2.6 | Perch Aerial Feeders |
| Willie Wagtail | 20 | 1.9 | Low: Invertebrates |

*Table 4: All species recorded in 2016-17 with a reporting rate of greater than 20%.*

The icon site assessment scores (Figure 2) showed a decrease in condition of the box and sandhill habitats, with box habitat score falling from very good to moderate and sandhill habitat decreasing from moderate to poor. Red gum Site Quality 2 and 3 both increased from moderate to good. Site Quality 1 red gum remained in the poor category.

Species diversity was representative of the diversity experienced since 2013, and a gradual decline since the early 2000's (Figure 3) can be seen across the survey period.

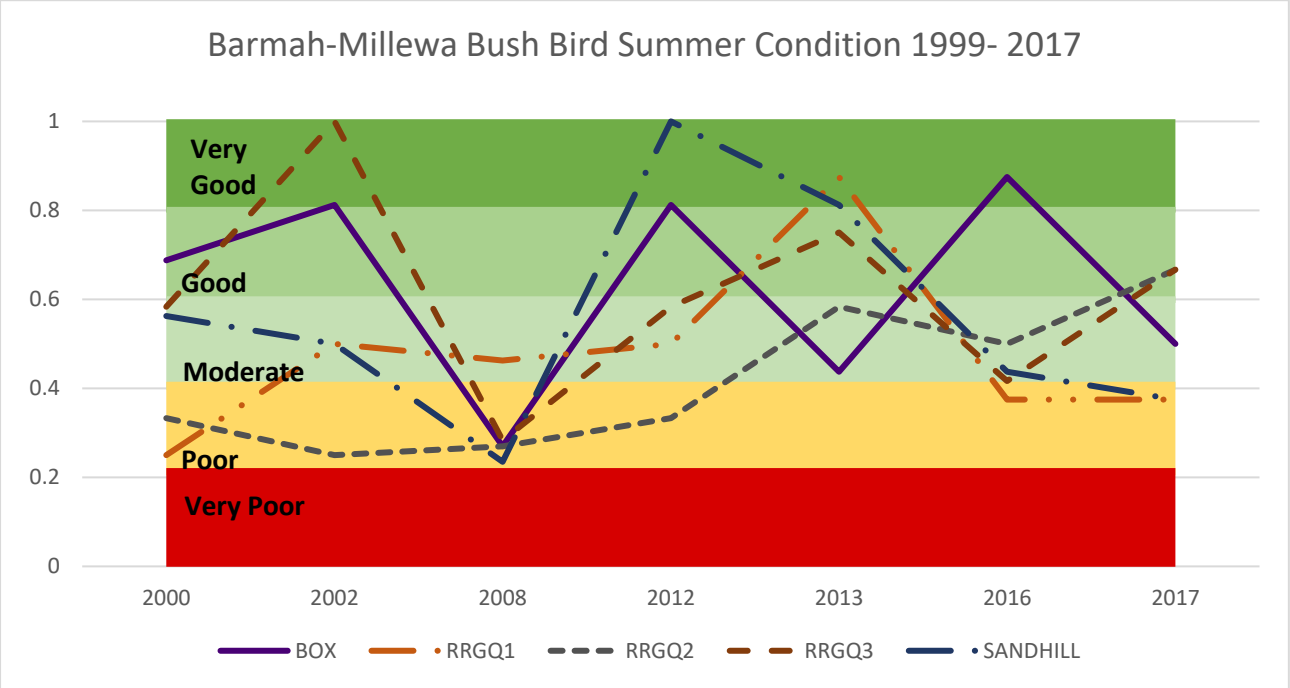


*Figure 2: Summer Icon Site Assessment Scores from 2000 to 2017.*

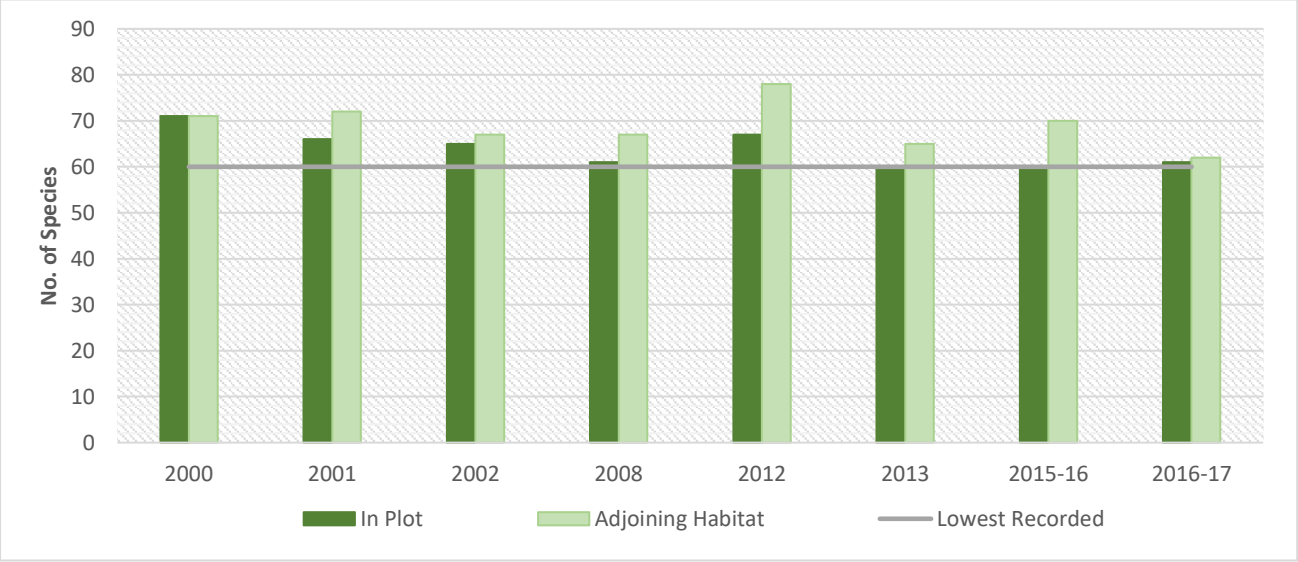


*Figure 3: Species diversity across all years.*

# 4. Discussion

Declines in Australian woodland birds are well documented (Ford et al, 2001; Barrett et al, 2003; Olsen 2008). Dry land river systems represent significant direct and indirect importance to woodland bird assemblages, through productive floodplain environments (McGuinness et al, 2010). Barmah-Millewa Forest provides critical habitat for a diversity of species, and productive wetland complexes support a diverse woodland bird community. Surveys have collected data on woodland bird assemblages within the state forest turned national park across eight in eighteen years, providing temporal and spatial trends in woodland bird abundance and diversity.

An overall total of 97 terrestrial bird species have been identified since monitoring began in 1999. Previous research has yielded varying species diversity within these habitats. Chesterfield et al, in 1984 surveyed only Barmah Forest and recorded 108 terrestrial bird species, which included historical, incidental and opportunistic observations. Tzaros in 2002, surveyed riparian habitats from the Ovens to Walpolla Island, identifying 143 species utilising Victorian River Red Gum forests (1 NSW site was included). Webster recorded 79 species across the central Murray from 1999 to 2004, and found that Millewa Forest possessed the most diverse habitat surveyed, with a total of 67 different species. The maximum species recorded in one year across the central Murray was 79 in 2001/02. These earlier records show that a higher diversity of woodland birds was identified pre- millennium drought, and Barmah-Millewa alone isn't representing the whole diversity of woodland birds across the central Nurray.

The maximum species diversity recorded across the entire survey period was 71 species (2000) and a minimum of 60 species (2013, 2015-16). 61 species were identified in the surveys in 2016-17. Since 2008, the diversity has remained close to the minimum with a brief increase recorded in 2012. The increase could be the result of improvements in productivity and tree canopy conditions in 2010 and 2011. Data was not collected between 2008 and 2012, meaning that species diversity could have potentially further decreased before increasing in 2012. The data from 2014 onwards suggest that bush bird assemblages have not fully recovered from the impacts of the millennium drought.

In 2016, widespread flooding occurred in the forest (and across the wider southern basin). River red gum site quality 1 sites were particularly affected, with all site quality 1 sites experiencing significant inundation throughout spring, preventing data collection at some sites. This may result in communities utilising these habitats in floods being underrepresented. For some sites, water levels had dropped prior to the end of spring which allowed surveys to be conduct, albeit a bit later in the season than usual.

Icon site assessment scores have been developed to enable quantitative measure of condition across years. All the habitat types recorded the lowest scores in 2008 (except for RRGQ2), which was one of the only years that data was collected throughout the millennium drought. The ability to assess habitat

condition through bush bird assemblages is a cost-effective and effective way to monitor vegetation health through time.

The icon site condition scores reflect the research which has shown red gum habitats possess lower species diversity than box and sandhill/pine habitats (Antos and Bennett, 2005). Barman-Millewa river red gum sites have lower scores throughout the survey period than both sandhill/pine and box sites. River red gum habitats also display lower species diversity and abundance than black box (McGuiness et al, 2010) and white cypress pine habitats have been shown to have the greatest richness in terms of ground foraging species (Antos & Bennett, 2005).

Woodland bird habitat quality has been degraded across the Murray-Darling Basin, which further illustrates the importance of wetland watering for holistic outcomes including woodland bird assemblages. Floodplain habitats have not been widely researched in the past for terrestrial fauna outcomes, however the bush bird condition monitoring program is critical for assessing the benefits of environmental watering for the whole of system. The long-term collection of bird data is an important tool to assess overall forest health and ensure a holistic approach to management.

# Appendix 1

Bush bird records for 2016-17 in attached spreadsheet.

# Appendix 2

Barmah-Millewa Site photos in attached PDF.

# Appendix 3

| Listed in VWBC | VWBC Scientific name | VWBC classification |
|---|---|---|
| Apostlebird | Struthidea cinerea | Specific |
| Barking Owl | Ninox connivens | Specific |
| Black-chinned Honeyeater | Melithreptus gularis | Specific |
| Brown Treecreeper | Climacteris picumnus victoriae | Specific |
| Brown-headed Honeyeater | Melithreptus brevirostris pallidiceps | Specific |
| Bush Stone-curlew | Burhinus grallarius | Specific |
| Chestnut-rumped Thornbill | Acanthiza uropygialis | Associated |
| Crested Bellbird | Oreoica gutturalis | Associated |
| Crested Shrike-tit | Falcunculus frontatus | Associated |
| Diamond Firetail | Stagonopleura guttata | Specific |
| Dusky Woodswallow | Artamus cyanopterus | Associated |
| Eastern Yellow Robin | Eopsaltria australis | Associated |
| Emu | Dromaius novaehollandiae | Associated |
| Fuscous Honeyeater | Lichenostomus fuscus | Specific |
| Gilbert's Whistler | Pachycephala inornata | Associated |
| Glossy Black-cockatoo | Calyptorhynchus lathami | Associated |
| Grey Falcon | Falco hypoleucos | Associated |
| Grey-crowned Babbler | Pomatostomus temporalis | Specific |
| Ground Cuckoo-shrike | Coracina maxima | Specific |
| Hooded Robin | Melanodryas cucullata | Specific |
| Jacky Winter | Microeca fascinans | Specific |
| Little Lorikeet | Glossopsitta pusilla | Specific |
| Major Mitchell's Cockatoo | Cacatua leadbeateri | Associated |
| Malleefowl | Leipoa ocellata | Associated |
| Masked Owl | Tyto novaehollandiae | Associated |
| Painted Button-quail | Turnix varia | Specific |
| Painted Honeyeater | Grantiella picta | Specific |
| Powerful Owl | Ninox strenua | Associated |
| Red-capped Robin | Petroica goodenovii | Specific |
| Red-tailed Black-cockatoo | Calyptorhynchus banksii | Specific |
| Regent Honeyeater | Xanthomyza phrygia | Specific |
| Regent Parrot | Polytelis anthopeplus | Associated |
| Restless Flycatcher | Myiagra inquieta | Associated |
| Rufous Songlark | Pachycephala rufiventris | Associated |
| Southern Whiteface | Aphelocephala leucopsis | Associated |
| Speckled Warbler | Chthonicola sagittata | Specific |
| Square-tailed Kite | Lophoictinia isura | Associated |
| Superb Parrot | Polytelis swainsonii | Specific |
| Swift Parrot | Lathamus discolor | Specific |
| Turquoise Parrot | Neophema splendida | Specific |
| Varied Sittella | Daphoenositta chrysoptera | Associated |
| Western Gerygone | Gerygone fusca | Specific |
| White-browed Babbler | Pomatostomus superciliosus | Associated |
| White-browed Woodswallow | Artamus superciliosus | Associated |
| Yellow-tufted Honeyeater | Lichenostomus melanops meltoni | Specific |

# 5. References:


Antos, M.J and Bennett, A.F., 2005. 'How important are different types of temperate woodlands for ground-foraging birds?', *Wildlife Research,* CSIRO Publishing.

Blackwood, A., Kingsford, R., Nairn, L. and Rayner, T. 2010. 'The effect of river red gum decline on woodland birds in the Macquarie Marshes', Australian wetlands and Rivers Centre, University of New South Wales.

Bureau of Meteorology, 2016. Monthly Rainfall: Mathoura State Forest, accessed on 20/8/16. http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=139&p_display_type=dataFile&p_stn_num=074069

Chesterfield, E.A., Loyn, R.H. and MacFarlane, M.A. 1984. 'Flora and Fauna of Barmah State Forest and Their Management'. Forests Commission of Victoria, Research Branch Report No. 240.

Christidis, L. and Boles, W.E. 2008. Systematics and Taxonomy of Australian Birds. CSIRO Publishing, Collingwood.

DSE (2013) Advisory List of Threatened Vertebrate Fauna in Victoria - 2013. Department of Sustainability and Environment, East Melbourne, Victoria.

Forestry Commission of NSW. 1985. Management Plan for Murray Management Area. (amended 1987). Forestry Commission of NSW, Sydney.

McGuinness, H., Arthur, A., Reid, J., 2010. Woodland bird declines in the Murray-Darling Basin: are there links with floodplain change?, The Rangeland Journal, CSIRO Publishing, Clayton.

Office of Environment & Heritage (OEH). 2012a. Quarterly Report: Bird Monitoring within Barmah-Millewa Forest – Winter 2011. Unpublished report. Office of Environment and Heritage and Murray Darling Basin Authority.

Office of Environment & Heritage (OEH). 2012b. Quarterly Report: Bird Monitoring within Barmah-Millewa Forest – Spring 2011. Unpublished report. Office of Environment and Heritage and Murray Darling Basin Authority.

Office of Environment & Heritage (OEH). 2012c. Quarterly Report: Bird Monitoring within Barmah-Millewa Forest – Summer 2012. Unpublished report. Office of Environment and Heritage and Murray Darling Basin Authority.

Office of Environment & Heritage (OEH). 2013. Draft: Bird Monitoring within Barmah-Millewa Forest: 2012-13. Unpublished Report. Office of Environment and Heritage and Department of Primary Industries – Water.

Office of Environment & Heritage (OEH). 2016. Bush bird Monitoring in Barmah-Millewa Forest, 2015-16. Unpublished report. Office of Environment and Heritage.

Reid, J.R.W. 1999. Threatened and declining birds in the New South Wales Sheep-Wheat Belt: I. Diagnosis, characteristics and management. Consultancy report to NSW National Parks and Wildlife Service. CSIRO Wildlife and Ecology, Canberra.

Robinson, D. and Traill, B.J. 1996. Conserving Woodland Birds in the Wheat and Sheep Belts of Southern Australia. RAOU Conservation Statement No. 10. RAOU, Melbourne.

Traill, B.J. 2015. Declines in Woodland Birds in New South Wales. The Wilderness Society Australia, July 31, 2015.

Tzaros, C.L. 2001. Importance of riparian vegetation to terrestrial avifauna along the Murray River, south-eastern Australia. MSc Thesis, Deakin University.

Watson, D.M. 2011. A productivity-based explanation for woodland bird declines: poorer soils yield less food. Institute for Land, Water and Society, Charles Sturt University, CSIRO Publishing,

Webster R. 2004a. The Influence of Flooding & Drought on Bush Birds within Barmah-Millewa Forest 1999-2002. Unpublished report to Forests NSW. Ecosurveys Pty. Ltd., Deniliquin.

Webster R. 2004b. The Effect of Flooding on Waterbirds within Barmah-Millewa Forest 1999-2003. unpublished report to Forests NSW. Ecosurveys Pty. Ltd., Deniliquin.

Webster, R. 2008a. Quarterly Report: Summer Bird Monitoring within Barmah-Millewa Forest. A Living Murray Icon Site. Unpublished report to Forests NSW. Ecosurveys Pty. Ltd., Deniliquin.

Webster, R. 2008b. Quarterly Report: Autumn Bird Monitoring within Barmah-Millewa Forest. A Living Murray Icon Site. Unpublished report to Forests NSW. Ecosurveys Pty. Ltd., Deniliquin.

Webster, R. 2008c. Quarterly Report: Winter Bird Monitoring within Barmah-Millewa Forest. A Living Murray Icon Site. Unpublished report to Forests NSW. Ecosurveys Pty. Ltd., Deniliquin.

Webster, R. 2008d. Quarterly Report: Spring Bird Monitoring within Barmah-Millewa Forest. A Living Murray Icon Site. Unpublished report to Forests NSW. Ecosurveys Pty. Ltd., Deniliquin.

Webster, R. 2010a. Quarterly Report: Summer Waterbird Monitoring within Barmah-Millewa Forest. A Living Murray Icon Site. Unpublished report to Forests NSW. Ecosurveys Pty. Ltd., Deniliquin.

Webster, R. 2010b. Quarterly Report: Autumn Waterbird Monitoring within Barmah-Millewa Forest. A Living Murray Icon Site. Unpublished report to Forests NSW. Ecosurveys Pty. Ltd., Deniliquin.

Webster, R. 2010c. Quarterly Report: Winter Bird Monitoring within Barmah-Millewa Forest. A Living Murray Icon Site. Unpublished report to Forests NSW. Ecosurveys Pty. Ltd., Deniliquin.

Webster, R. 2010d. Quarterly Report: Spring Bird Monitoring within Barmah-Millewa Forest. A Living Murray Icon Site. Unpublished report to Forests NSW. Ecosurveys Pty. Ltd., Deniliquin.