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MURRAY GOULBURN

Winton Wetlands bird survey – phase 1 review

BirdLife Murray Goulburn (BLMG)

Final (v3)

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Acknowledgements

Kathy Costello and Val La May (BLMG members) have coordinated these surveys since their inception in 2013.

Val has undertaken data entry.

Winton Wetlands Committee of Management have supported BLMG.

Summary

This report undertakes a first pass review of bird data gathered by BirdLife Murray Goulburn (BLMG) at Winton Wetlands since 2013. This review may prompt other, more detailed, analysis of Winton Wetland bird data or other relevant factors.

BirdLife Murray Goulburn (BLMG) members have undertaken quarterly bird surveys at Winton Wetlands since 2013. The objectives of the surveys are to:

- Provide a longitudinal survey of bird diversity and abundance
- Provide data for Winton Wetlands Committee of Management
- Provide for information about birds in the wetland
- Inform the Winton monitoring plan.

Winton Wetlands

The area now known as the Winton Wetlands Reserve was permanently inundated in 1970 by the construction of the Lake Mokoan storage reservoir, the purpose of which was to supply irrigation and stock and domestic water to the district. At full supply level, Lake Mokoan covered an area of approximately 7880 ha, resulting in the death of an estimated 2900 ha of Red Gum woodland, and considerable disturbance to wetlands and farmland pasture present prior to inundation.

Lake Mokoan rarely reached full supply level suggesting that much of the area has been in a “recovery” phase since about 1990.

In 2004, the Victorian Government moved to decommission Lake Mokoan and return the area to a more natural wetland state as part of the *Our Water Our Future* White Paper policy initiative.

It is easy to think of Winton Wetlands as one large wetland, subject to wetting and drying cycles depending on weather and climate. In fact, the wetland is an interesting mosaic of wetland and dryland ecological units.

A simple analysis of climate data suggests that the Winton Wetlands environment is drier and warmer than it was prior to about 1996. Implications for birdlife at Winton are unknown.

BLMG surveys

BLMG surveys are undertaken at 11 or 12 sites (depending on access) on a quarterly basis with teams of 3-4 BLMG members undertaking bird surveys at sites

Survey method is: survey each site for at least 20 minutes even if no water is in area or ***Area Survey*** is within 500m or 5km of central point for *at least* 20 min. Relevant other information is recorded eg fullness of wetlands.

Survey sites can be either wetlands, bushland or both. Data is entered in eBird (http://www.ebird.org/australia).

Data analysis

For this preliminary data review BLMG Winton data was extracted (on request) from eBird (https://ebird.org/australia/home). Data was provided as a CSV file and converted to an XLXS file enabling analysis to be undertaken using Excel. The data set comprised about 5396 rows of data.

Before analysis data cleansing was undertaken.

Habitat types

Survey points comprise two broad types of habitat:

- Wetland, with varying water levels, depending on seasonal conditions
- Woodland.

No attempt has been made to further investigate habitat condition on bird species abundance and richness, except to note hydrological status of wetlands.

Data analysis

To aid analysis bird species have been loosely classified into waterbird and woodland (bush) birds.

Reporting rate is a measure (usually percentage) of the number of times a species was recorded at a site (this can be reported by site or all sites) vs the number of visits to a site.

Results - Overview

Table S1 Data Summary

Number of species	164
Conservation status[1]	
• Least concern	155
• Near threatened	2
Waterbirds	54
Woodland (bush) birds	103
Introduced	7

The cumulative number of species recorded over the period 2013 to 2018 seems to have leveled off, perhaps indicating there aren't too many more species to be sighted at the locations and times we currently survey.

[1] From BirdLife Australia (2017). The BirdLife Australia Working List of Australian Birds; Version 2.1 Downloaded from http://www.birdlife.org.au/documents/BWL-BirdLife_Australia_Working_List_v2.1.xlsx. Conservation status is based on IUCN Red List

Conservation status of birds

Conservation of status of birds recorded has been assessed.

Somewhat surprisingly only two recorded species have IUCN near threatened status. These are:

- Red-necked Stint
- Flame Robin.

A number of Victorian Flora and Fauna Guarantee Act species occur.

There are no EPBC Threatened species recorded.

This data suggests a severe decline in Diamond Firetail numbers, although its reporting rate is high, probably due its presence in the early years of the surveys.

Great Egret numbers seem to have increased over the past few years.

27 species have been recorded in one year only, while 75 species have been recorded in every year the surveys have been undertaken.

Annual patterns

Numerically, waterbirds outnumber bushbirds, but bushbirds species richness is far greater than that of waterbirds. Waterbird numbers vary enormously, presumably as a result of the presence of water in the wetlands (especially 2014 and 2018). Bushbird abundance, on the other hand, is relatively constant.

Bushbird richness has remained fairly constant since 2013. There is some variation, but there are no obvious major trends. A slight downwards trend from 2014 onwards will be worth watching.

Waterbirds

Waterbird abundance by year varies as water levels vary. More water equals more waterbirds.

Waterbird richness

Waterbird richness has varied a little over time. Richness in 2017 was highest with 48 species while the preceding year, 2016 had the lowest richness of 31 species. Presumably this is highly influenced by climatic conditions.

Waterbird functional group

Waterbirds have been further analysed by grouping them into functional group type. Dabbling ducks provide over 80% of bird abundance; these include seven species, but numbers are dominated by Grey Teal which comprise 92% of records of Dabbling Ducks.

Bird abundance by site

For wetland birds:

- The Spit has high abundance
- The Duckpond also has high abundance
- Sites close to water have high abundance (the Spit, duck Pond, Dam Wall).

For bushbirds, abundance is much more even.

On abundance per visit basis, the Dam Wall, Duck Pond, the Spit and the Yacht Club area have high wetland bird abundance. High bushbird per visit sites include Ashmeads Swamp, Dam Wall, Duck Pond, Greens Hill, the Spit and the Visitor and Picnic area.

The bushbird to waterbird ratio indicates that sites such as 11 Mile Creek, Greens Hill, Humphries Hill have an overwhelmingly bushbird fauna (high B/W ratio) while the Dam Wall, Duck Pond, Humphries Swamp and the Spit are overwhelmingly waterbird sites. Other sites have a mixture of bush and waterbirds.

Bushbird functional group analysis

Bushbird abundance is dominated by seed gatherers (SG) and carnivores (V) with lesser numbers of aerial (A), on the ground insectivores (OG) and nectivores (N). This is probably not surprising given 1) the extensive grassland areas that could provide seeds and 2) the high number of raptors present. Richness is spread across a range of feeding functional groups with no particular group dominating although carnivores (V) and seed gatherers (SG) are well represented.

Abundance is dominated (60%) by birds that nest amongst branches of trees and shrubs (N). Hollow utilising species (LH and SH) make up a much less abundant proportion (about 15% each), which is somewhat surprising given the vast numbers of hollows present in dead trees at Winton Wetlands. Richness is dominated (65%) by birds that nest among branches of trees and shrubs

Raptors

A feature of visits to Winton Wetlands is the presence of an abundance of raptors. Thirteen raptors can be found; Brown Falcon, Nankeen Kestrel, Wedge-tail Eagle and Whistling Kites are common. There does not appear to be any annual trends in abundance. The continued presence of White Bellied Sea Eagles is significant.

“Gainers” and “losers”

A cursory eye-balling of the species abundance by year data suggests there may be species that have gained abundance (gainers) over time and others that have lost abundance (losers) over time.

Gainers include introduced species of Common Starling, House Sparrow and Noisy Miner, in addition to Eastern Rosella and Great Egret.

It is likely the increase in Great Egret numbers is due to favorable wetland conditions (ie plenty of water in the wetlands). Numbers might be expected to decline during dry conditions.

Losers include Diamond Firetail, Red-capped Plover and Scarlet Robin.

The apparent decline of Red-capped Plover may be due to changes in wetland extent.

Victorian Temperate Woodland Bird Community

Nine of the 24 species making up Victorian Temperate Woodland Bird Community occur at Winton Wetlands.

Introduced birds

There are a number of introduced birds at Winton Wetlands. Numbers of these birds seem to be increasing. Ashmeads Swamp, Bill Friday’s Swamp, the Dam Wall and The Spit have high numbers. Numbers are dominated by Common Starling, with lesser numbers of Common Mynah and House Sparrow.

Comparison with benchmarks

To gain an appreciation of the significance of Winton as a bird site Winton Wetland bird data can be compared with similar indicators from other sites. This isn't a straight forward exercise because survey methods, habitat types and a range of other factors are variable. However, such comparisons can give useful information.

This indicates that BLMG surveys have reported higher wetland bird richness and abundance.

Comparison of Winton Wetland bushbird abundance and richness against a number of other studies suggests that overall Winton Wetland bushbird richness is very high.

Winton Wetland bushbird richness appears to be high when compared with data from other sources. Waterbirds richness and abundance is highly variable, depending on seasonal conditions.

Comparison with full eBird Winton data set

The full eBird data set for Winton Wetlands (accessed from www.ebird.org 26/11/2018) includes survey results from BLMG and other eBird contributors over a long period of time and indicates the presence of 191 species. Of the 191 species, there are 33 species not recorded by BLMG during the quarterly surveys, but seen by others.

It is unlikely that all of these species will ever be recorded by BLMG since some are nocturnal, have specific habitat requirements not present at BLMG sites or are extremely rare or locally extinct.

Assessment against monitoring plan

Significant birds

The Winton Wetlands Monitoring Plan includes a table of significant bird species at Winton Wetlands. Ten species listed in the monitoring plan have not been recorded, while others have been recorded a few times (eg Caspian Tern, Latham's Snipe, Little Egret, Nankeen Night Heron) and some are very regularly sighted (eg Freckled Duck, Hardhead, Australian Shoveller). Interestingly Grey-crowned Babblers are not included in this list.

For some species, eg Lathams Snipe, Bittern, targeted surveys may be required.

Assessment against monitoring objectives

The monitoring plan includes a number of statements relevant to monitoring. Some of these statements can be assessed (Table S2) using information gleaned from BLMG quarterly surveys.

Table S2 Assessment of monitoring statements

Monitoring statement	**Assessment**
ongoing efforts to restore and enhance habitat is the recommended approach for increasing the diversity and abundance of bird populations	*Diversity and abundance don't seem to be changing much; therefore, habitat hasn't been restored and enhanced? This might take time or alternatively habitat has already reached some sort of equilibrium state (given that much of the area has had relatively little disturbance since about 1990).*
Monitoring of the Latham's Snipe population should be conducted over a number of years (5+) when habitat	*Few Latham's Snipe recorded. Either not present or habitat is not suitable in most years (investigate further) or we're not going to the right places*

conditions are suitable to ascertain the value of Winton Wetlands for this species	*Investigate further -targeted survey?*
The populations and breeding success of colonial breeding species (e.g. Intermediate Egret, Great Egret, Nankeen Night-heron, Pied Cormorant and Little Black Cormorant) should also be documented on an annual basis to determine the importance of Winton Wetlands as a breeding site for colonial waterbirds.	*BLMG doesn't indicate breeding success – haven't seen breeding events. Increase in population of Great Egret may indicate breeding.* *Very few Intermediate Egret recorded. Nankeen Night-Heron present in one year only (2017 – water present?).* *Pied cormorant not abundant; Little Black Cormorant present in high numbers only when water and fish present (2017).* *Can't say that Winton Wetlands is an important breeding site for colonial waterbirds.*
Monitoring of the status of state or nationally threatened bird fauna should also be undertaken to provide evidence supporting the value of Winton Wetlands. These include the White-bellied Sea-eagle, the Australasian Bittern, Freckled Duck (both nationally endangered), Australasian Shoveler and the Hardhead, two species of duck listed as vulnerable in Victoria.	*White Bellied Sea Eagle regularly recorded (in low numbers).* *Australasian Bittern not recorded.* *Freckled Duck reported in some years (water related)* *Australasian Shoveler recorded in all years.* *Hardhead recorded in reasonable numbers*
Winton Wetlands will, if not already, become a popular venue for bird watching enthusiasts. In consultation with one local bird observer (Michael Ramsey), a list of sites has been mapped (Figure 20) that provides the best bird watching opportunities at Winton Wetlands	*eBird records provide hotspot information; attract visitors*
Improvement in ecological function at Winton Wetlands will be indicated by, amongst other things, an increase in the structural diversity of woodland vegetation, indicated by an increase in the diversity and abundance of woodland birds	*Not seeing this at BLMG sites – no clear trend.* *This might take time or alternatively habitat has already reached some sort of equilibrium state (given that much of the area has had relatively little disturbance since about 1990)*

Conclusion

The BLMG bird surveys are useful and can provide valuable information about birds at Winton.

BLMG bird surveys provide a useful source of data to assess ecological function at Winton Wetlands

Winton Wetlands are an important bird site – both waterbirds and bushbirds

Recommendations

- Further investigate effects of habitat and habitat condition on bird abundance and richness
- Investigate population status of Diamond Firetails
- Keep an eye on bushbird richness and abundance
- Consider rationalizing sites with low richness/abundance

- Review Barlow list
- Consider targeted surveys for some species eg Lathams Snipe, Australasian Bittern and species not seen to date
- Investigate changes in diversity and abundance against habitat restoration and enhancement – is it happening?
- Review BLMG Winton Wetland sites to determine their utility for other bird conservation programs)
- Consider targeted survey for those Barlow and eBird species not seen to date.

- Review data annually and every 5 years or so

- This has been a first pass data review. More detailed analysis could yield more insights.

1 Purpose of this report

The purpose of this report is to undertake a first pass review of bird data gathered by BirdLife Murray Goulburn (BLMG) at Winton Wetlands since 2013.

This review may prompt other, more detailed, analysis of Winton Wetland bird data or other relevant factors.

2 Introduction

BirdLife Murray Goulburn (BLMG) members have undertaken quarterly bird surveys at Winton Wetlands since 2013. The objectives of the surveys are to:

- Provide a longitudinal survey of bird diversity and abundance
- Provide data for Winton Wetlands Committee of Management
- Provide for information about birds in the wetland
- Inform the Winton monitoring plan.

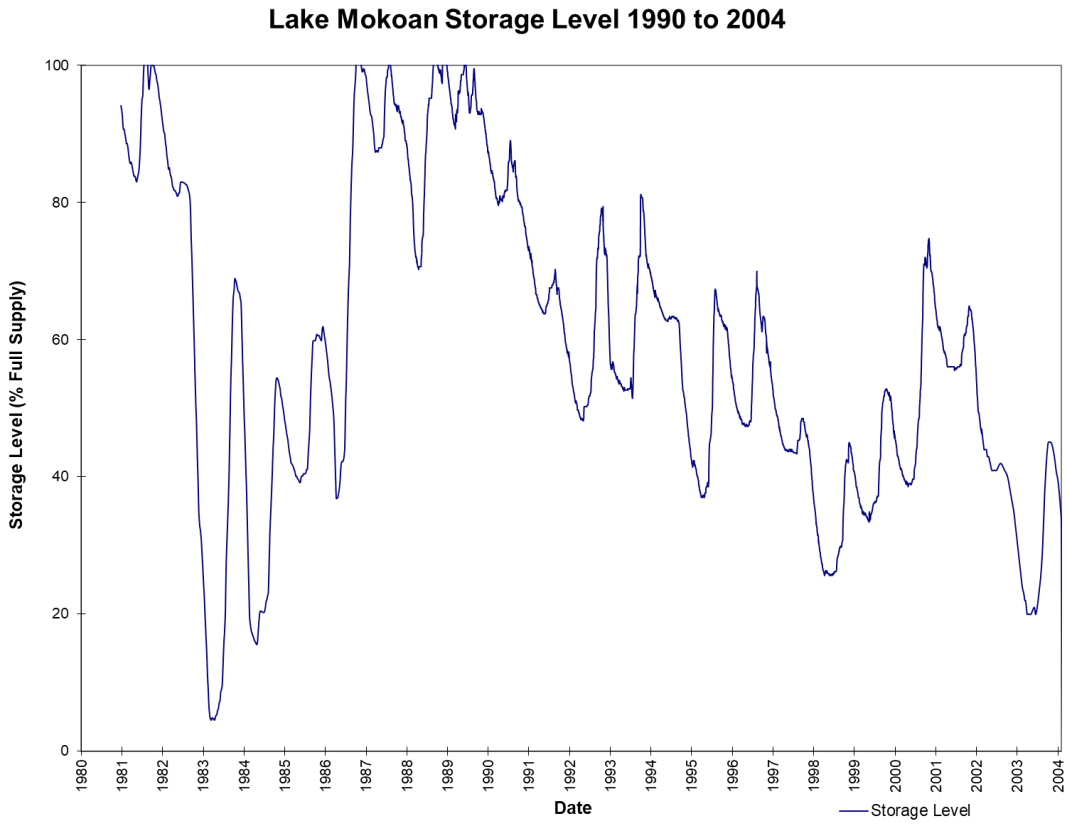
A short report on the monitoring undertaken in 2013-14 was prepared and another in 2017 (see Section 15.4)

3 Winton Wetlands

The area now known as the Winton Wetlands Reserve was permanently inundated in 1970 by the construction of the Lake Mokoan storage reservoir, the purpose of which was to supply irrigation and stock and domestic water to the district. At full supply level, Lake Mokoan covered an area of approximately 7880 ha, resulting in the death of an estimated 2900 ha of Red Gum woodland, and considerable disturbance to wetlands and farmland pasture present prior to inundation.

Lake Mokoan rarely reached full supply level (Figure 1) suggesting that much of the area has been in a “recovery” phase since about 1990.

Figure 1 Lake Mokoan storage level 1990 to 2004.



In 2004, the Victorian Government moved to decommission Lake Mokoan and return the area to a more natural wetland state as part of the *Our Water Our Future* White Paper policy initiative. Water saved (by eliminating evaporation loss during storage) was allocated to environmental flows for the Murray and Snowy rivers. Extensive studies and consultation with stakeholders were undertaken, culminating in the Lake Mokoan Future Land-use Strategy (2006). In March 2010, the retaining wall was breached the original outlet, Stockyard Creek, which runs to the Broken River.

The Reserve occupies some 8750 ha, of which approximately 3500 ha is covered by a number of large and small wetlands. Much of this area is expected to be dry during prolonged dry periods, and an even greater area inundated during very wet years. The remainder comprises seasonally wet lowlands and drier rises including a major lunette separating the two of the larger wetlands, Winton Swamp and Green's Swamp. When full, these larger wetlands connect to a number of smaller ephemeral swamps located to the north-east of Green's Swamp. The drier areas of the Reserve have historically been used for conventional farming pursuits. Current vegetation in these parts of the Reserve varies from weedy native pasture to improved introduced pasture, with a few woodland remnants.

It is easy to think of Winton Wetlands as one large wetland, subject to wetting and drying cycles depending on weather and climate. In fact, the wetland is an interesting mosaic of wetland and dryland ecological units (Figure 2).

The area of actual wetlands varies with rainfall, this being a rain-fed system. The site is generally of very low topographical relief, so a small rise in water-level can result in hundreds of additional hectares being inundated. When water ceases to flow through the (fixed height) outlet, an area of 3108 ha remains inundated. This figure does not

include smaller wetlands that have become disconnected (but remain wet) from the main system as levels recede.

Figure 2 Winton Wetlands : EVCs (Barlow 2011)

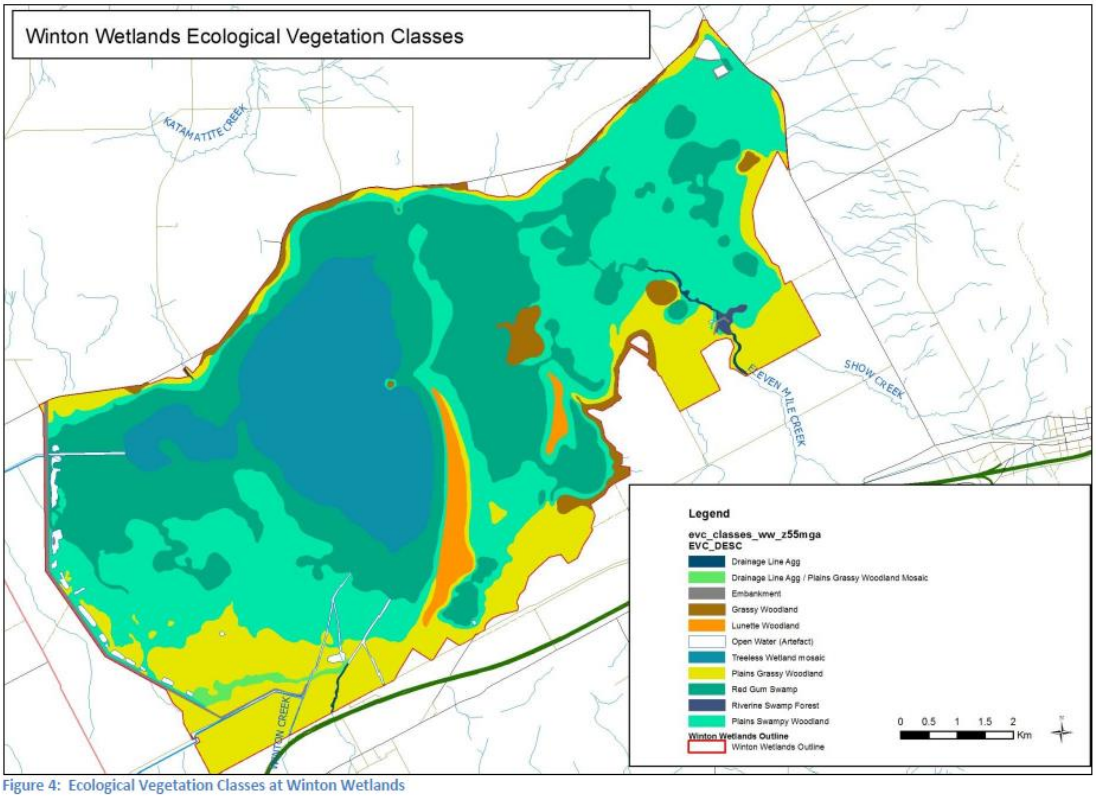


Figure 4: Ecological Vegetation Classes at Winton Wetlands

BECA (2006) noted that with some notable exceptions (Latham's Snipe, Great Egret), many significant fauna species are widespread in the study area but in relatively low numbers. Overall, most waterfowl species are widespread but numerically not well represented. The overall faunal species diversity of the dryland habitats is relatively low compared to other large wetlands in northern Victoria (eg. Kerang Lakes, Barmah and Gunbower forests), but is characterised by significant species.

They also noted that fauna management and monitoring will be an important aspect of the rehabilitation process and will be vital in assessing whether the wetland and dryland areas are restoring towards proposed ecological goals.

Lathams Snipe has been identified as a key species that has the potential to be impacted by the decommissioning process, and therefore it is recommended that a management plan be developed which incorporates monitoring of population trends and appropriate management responses, in line with the recommendations in the 'Additional Flora and Fauna Report' prepared as part of this study by Ecology Australia (2006). Latham's Snipe may also function as an 'umbrella' or indicator species to assist in the monitoring of developing wetland conditions for other wetland fauna species. Another species that could be used as an umbrella or indicator species would be Australasian Bittern. Appropriate indicator species will be considered as part of a Winton Wetlands Monitoring Plan.

Birds (from (Barlow 2011)

Barlow (2011), in the Winton Monitoring Plan, commented on the birds on the Winton Wetlands:

> Previous assessments of fauna at Winton Wetlands, although also limited in scope and extent, have recorded 185 species of birds present, six of which are introduced species There is little doubt that Winton Wetlands is of state significance for biodiversity conservation, given the sheer size of the wetland (amongst the largest ephemeral wetlands in Victoria), diversity of habitat, and the number and abundance of wetland bird species present.
>
> The Flora and Fauna Guarantee listed *Victorian Temperate Woodland Bird Community (see Section 7.12)* occurs in woodland zones at Winton Wetlands, principally along the Northern Shore, Eastern Rises between Ashmeads and 11 Mile Wetland, and the eastern end of the North-east Swamps along Glenrowan-Boweya Road. Significant component species are Grey-crowned Babbler (two groups), Regent Honeyeater (1 call), Diamond Firetail (common), Hooded Robin, and Brown Treecreeper.
>
> In addition, Winton Wetland Reserve is likely to be of international importance as a wetland supporting a substantial proportion of the eastern Australian population of Latham's Snipe *(Gallinago hardwickii)* (Carr and Conole 2006). Latham's Snipe migrates from its breeding grounds in northern Japan to over-summer in Australian wetlands in south-eastern Australia. It is considered 'near-threatened' in Victoria (DSE, 2003), and is subject to an international treaty between Australia and Japan (Japan – Australia Migratory Birds Agreement, JAMBA) developed to protect habitat in respective regions. As such, it is also listed under the Commonwealth Government's migratory bird provisions of the *Environment Protection and Biodiversity Conservation Act* (1999).
>
> By extrapolating the numbers observed during field work over the extent of suitable habitat, Carr and Conole (2006) estimated that total numbers of Latham's Snipe in the order of 300–600 birds were present at Winton Wetlands, which if verified, is greater than 1% of the migratory population estimate of 36,000 birds (Bamford *et al.,* 2008), a criterion for a site to be recognised as being of international importance under the Ramsar Convention.
>
> Significant bird observations at Winton Wetlands ((Carr G and Conole L. E. 2006)Carr and Conole 2006; Hamilton 2010(Hamilton S. 2010); Ramsey 2011; Victorian Biodiversity Atlas) are summarised in Table 28. The table only lists species that have a designated conservation status at the state or national level. Since decommissioning, a number of bird sightings at Winton Wetlands suggest that it is of very high regional importance, with a number of new records made recently for the region (e.g. Marsh Sandpiper, Sharp-tailed Sandpiper, Red-necked Stint and Spotted Crake). (Ramsay M. 2011)

3.1 Winton Monitoring Plan

The Winton Monitoring Plan (Barlow 2011) set out to provide guidance to the Winton Wetlands Committee of Management (WWCoM) on:

- the protection of existing biodiversity values across the site
- the restoration of habitat, particularly across drier areas
- areas for further research

- monitoring and reporting on management effectiveness.

The Winton Wetlands Restoration and Monitoring Strategic Plan proposes monitoring actions for birds:

Monitoring:

- In consultation with recognised experts, develop and implement monitoring programs to:
    - Ascertain population of Latham's Snipe over-summering at Winton Wetlands
    - Document breeding by colonial waterbirds (Intermediate Egret, Great Egret, Nankeen Night-heron, Pied Cormorant and Little Black Cormorant) and other significant species (e.g. White-bellied Sea-eagle, Hooded Robin, Diamond Firetail, Grey-crowned Babbler, Brown Treecreeper, Painted Button-quail)
    - Document utilisation of the site by state and nationally threatened bird species (especially Australasian Bittern, Little Bittern, Freckled Duck, Blue-billed Duck) – season, location/habitat, population size, breeding etc
- Surveillance monitoring to document use of Winton Wetlands by all bird fauna is encouraged and provides an ideal involvement and educational opportunity for the broader community.

The associated text states:

Like other fauna, ongoing efforts to restore and enhance habitat is the recommended approach for increasing the diversity and abundance of bird populations. Monitoring of the Latham's Snipe population should be conducted over a number of years (5+) when habitat conditions are suitable to ascertain the value of Winton Wetlands for this species. This is achieved by conducting transects through marshy vegetation three to four times over summer and counting birds flushed. Further details are provided in Conole (2007). The populations and breeding success of colonial breeding species (e.g. Intermediate Egret, Great Egret, Nankeen Night-heron, Pied Cormorant and Little Black Cormorant) should also be documented on an annual basis to determine the importance of Winton Wetlands as a breeding site for colonial waterbirds. Monitoring of the status of state or nationally threatened bird fauna should also be undertaken to provide evidence supporting the value of Winton Wetlands. These include the White-bellied Sea-eagle, the Australasian Bittern, Freckled Duck (both nationally endangered), Australasian Shoveler and the Hardhead, two species of duck listed as vulnerable in Victoria.

Winton Wetlands will, if not already, become a popular venue for bird watching enthusiasts. In consultation with one local bird observer (Michael Ramsey), a list of sites has been mapped (Figure 20) that provides the best bird watching opportunities at Winton Wetlands (refer to Section 4).

Improvement in ecological function at Winton Wetlands will be indicated by, amongst other things, an increase in the structural diversity of woodland vegetation, indicated by an increase in the diversity and abundance of woodland birds.

Section 10 provides an assessment against these points.

Issue BLMG bird surveys provide a useful source of data to assess ecological function at Winton Wetlands

3.2 Swamps, Rivers and Wetlands

The Swamps Rivers & Ranges Bird Monitoring project undertakes quarterly monitoring at Winton Wetlands (8 seasons since 2015 to 2017). It is understood that BLMG survey data is provided to the Swamps Rivers and Ranges project for entry to Birdata.

4 BLMG survey

4.1 Method

BLMG surveys are undertaken at 11 or 12 sites (depending on access) on a quarterly basis with teams of 3-4 BLMG members undertaking bird surveys at sites (Figure 3 and Table 1). Teams comprise at least 1 or 2 experienced bird observers. Other team members may also be well experienced or else provide addition “eyes” for spotting of birds.

Survey method is: survey each site for at least 20 minutes even if no water is in area or ***Area Survey*** is within 500m or 5km of central point for *at least* 20 min. Relevant other information is recorded eg fullness of wetlands.

Survey sites have varied a little over time. Current sites are shown in Table 1 and Figure 3. The number of visits to all sites (current and discontinued) is shown in Table 2.

Survey site selection was based on information provided by Michael Ramsay.

Survey sites can be either wetlands, bushland or both. The Winton Wetlands site is a placeholder for incidental sightings, recorded by survey teams on their way to, or from, their monitoring sites.

Data is entered in eBird (http://www.ebird.org/australia).

Data entry is checked by the survey team.

Some team members may submit photos of birds observed. Data can also include relevant comments, for example, water level.

Survey dates are always the first Wednesday of February, May, August and November.

Table 1 Current monitoring sites (type = W (wetland) or B (bush/woodland)

Site No.	Site Name	Lat/Long Area (full)	Access Road	Type	Survey Type*
1	"Visitors' Area": Boat Ramp & Woodland	S 36° 27' 30" E 146° 05' 27" 2,700ha	Lake Mokoan Rd.	W/B	Both
2	Northern Shore Woodland	S 36° 25' 37.1" E 146° 04' 14.2"	Opposite 809 Lake Mokoan Rd.	B	20min. /2 ha
3	Duck Pond	S 36° 24' 03" E 146° 08' 53" 12ha	Lake Mokoan Rd.	W	Area

4	11 Mile Cr. Woodland (not 11 Mile Wetland)	S 36° 26' 38.9" E 146° 09' 12.1"	Cnr.11 Mile Rd. & Humphries Lane (1.3km from gate on Humphries Ln.)	B	20min. /2 ha
5	Humphries Hill	S 36° 26' 19" E 146° 08' 24"	Cnr.11 Mile Track & Winton North Rd.	B	20min. /2 ha
6	Ashmeads Swamp	S 36° 27' 56.3 E 146° 07' 53.1" 55ha.	Winton North Rd., turn S on Ashmeads Swamp Rd	W	Area
7	Green's Hill	S 36° 26' 55" E 146° 06' 50"	Boggy Bridge Rd.	B	20min. /2 ha
8	Bill Friday Swamp -	S36° 29' 20" E 146° 06' 11" 42ha.	Winton North Rd. (Need to go thro locked gate to access.)	W	Area
9	The Spit Main wetland: ca. 2700ha.	S 36° 27' 09" E 146° 05' 34"	Off Winton North Rd	W	Area
10	Dam Wall, Outlet Channel, Borrow Pits 1-12	Pit 1 S 36° 27' 54" E 146° 01' 14"	Dam Wall Rd. (S end on Benalla - Yarrawonga Rd., then Nelson Rd & Channel Track)	W	Area
Optional Site:	Boggy Bridge (lat/long is at creek crossing)	S 36°25'43.6" E 146°06'52.4"	Boggy Bridge Rd. from Lake Mokoan Rd. or Winton N Rd	W	Area
	Winton Wetlands		Placeholder for incidental sightings		

Figure 3 Monitoring sites

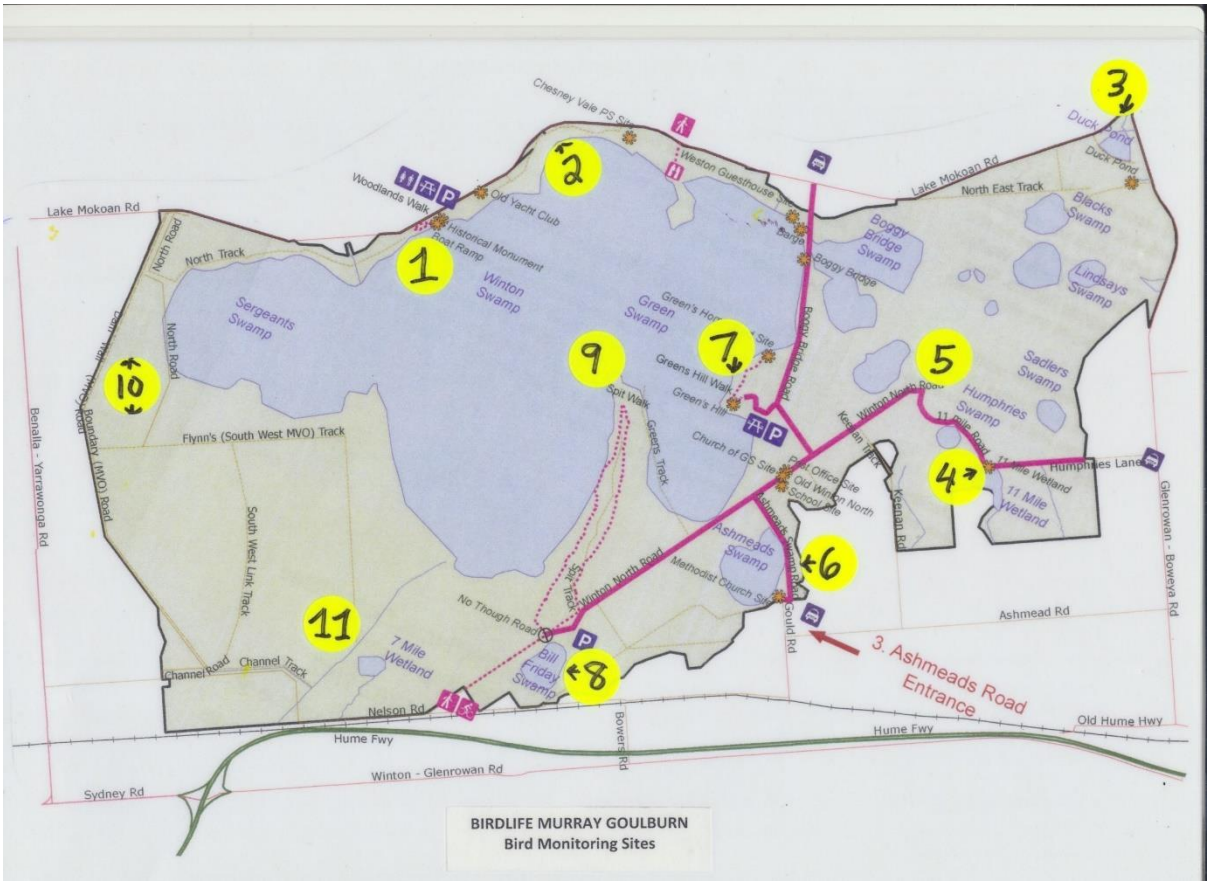


Table 2 Number of visits to each site (yellow shading = site removed from survey; grey – site added to survey; orange ad hoc site)

Site No	Location	Number of visits
	Winton Wetlands (incidental sightings)	23
4	Winton Wetlands--11 Mile Creek	11
6	Winton Wetlands--Ashmeads Swamp	17
8	Winton Wetlands--Bill Friday Swamp	23
	Winton Wetlands--Boat Ramp Woodland	2
	Winton Wetlands--Boggy Bridge	10
10	Winton Wetlands--Dam Wall and Borrow Pits	23
3	Winton Wetlands--Duck Pond	23
7	Winton Wetlands--Greens Hill	23
5	Winton Wetlands--Humphries Hill	23
	Winton Wetlands--Humphries Swamp	1
	Winton Wetlands--Inlet Channel woodland	1
	Winton Wetlands--Livingstons Woodland (restricted access)	12
2	Winton Wetlands--Northern Shore Woodland	23
	Winton Wetlands--Outlet Channel	1
	Winton Wetlands--Sadlers Swamp (restricted access)	4

Site No	Location	Number of visits
9	Winton Wetlands--The Spit	22
1	Winton Wetlands--Visitor and Picnic Area	23
	Winton Wetlands--Yacht Club	11

4.2 Survey site descriptions

See Section 15 for site photos and a brief description of survey sites.

4.3 Survey dates

Twenty-three surveys have been conducted since mid-2013 (Table 3).

Table 3 Survey dates

Year	Date Month
2013 (earlier surveys in 2013 were reconnaissance)	1 May
	7 August
	6 November
2014	5 February
	7 May
	6 August
	12 November
2015	4 February
	6 May
	5 August
	11 November
2016	3 February
	4 May
	3 August
	9 November
2017	1 February
	3 May
	2 August
	1 November
2018	7 February
	2 May
	1 August
	7 November

4.4 Volunteer input

Val La May estimates that over the life of the surveys (2013 to 2018 inclusive) BLMG members have provided 1196 hours of volunteer input.

4.5 Data

For this preliminary data review BLMG Winton data was extracted (on request) from eBird (https://ebird.org/australia/home). Data was provided as a CSV file and converted to an XLXS file enabling analysis to be undertaken using Excel. The data set comprised about 5396 rows of data. Attributes to facilitate analysis and data handling were added to the Excel file. Attributes of the data file are shown in Table 4.

The data extract included records from other BLMG visits to Lake Mokoan/Winton Wetlands. For this report, the analysis did not include this other data.

Before analysis data cleansing was undertaken. This included:

- Sorting out date formats (some dates were in the form dd-mm-yyyy, whereas the bulk of dates were in the form MM/DD/YYYY (US format))
- Aggregating sub-species to species level
- Removing generic species (eg grebe, raven)
- Some observations simply recorded presence or absence with a X. These were converted to numeric 1 to aid data processing.

Table 4 Data Dictionary (# indicates a user generated field)

Field	Description
Common Name	Common name of bird species
Common species #	Common name of bird species, with sub-species aggregated
Scientific Name	Scientific name of species
Taxonomic Order	Taxonomic order of species
Cons status #	Conservation status of the species; an additional attribute sourced from
FFG #	Fauna and Flora Guarantee Act conservation status
DELWP #	DELWP Advisory list status
EPBC #	EPBC Threatened species status
Function1 #	An added attribute classifying the species into bush (woodland) or waterbird species.
Function2 #	An added attribute classifying wetland birds into functional guilds (after XXXX
Count	The number of that species counted
Unique #	A generated attribute
State/Province	State ie Victoria
County	Municipality
Location	The BLMG survey site

Field	Description
Latitude	Latitude of the BLMG survey site
Longitude	Longitude of the BLMG survey site
Day #	Day of survey (derived from Date)
Month #	Month of survey (derived from Date)
Year #	Year of survey (derived from Date
Date US format	Date of survey in US format MMDDYYY
Time	Time of survey
Protocol	Survey protocol applied
Duration (Min)	Duration of survey
All Obs Reported	An eBird field for data entry
Distance Travelled (km)	Distance covered during the survey
Area Covered (ha)	Area covered during the survey
Number of Observers	Number of members in the survey team
Breeding Code	Indication of breeding behaviour
Species Comments	Any relevant comment
Common Name	

5 Environmental conditions

One of the key factors affecting bird diversity at Winton is the presence or absence of water in the wetlands.

In the absence of specific wetland water level data two surrogates can be used:

- Flow in the Broken River at Goorambat (Figure 4)(assuming that high Broken River flows indicate flows into Winton wetlands).
- Rainfall at Benalla(Figure 5) – assuming that high rainfall converts into flows that convert to flows into Winton wetlands.

These indicate 2016 was wet and possibly 2014.

Figure 4 Flow in Broken River at Goorambat 2010 to 2018 (source http://data.water.vic.gov.au/)

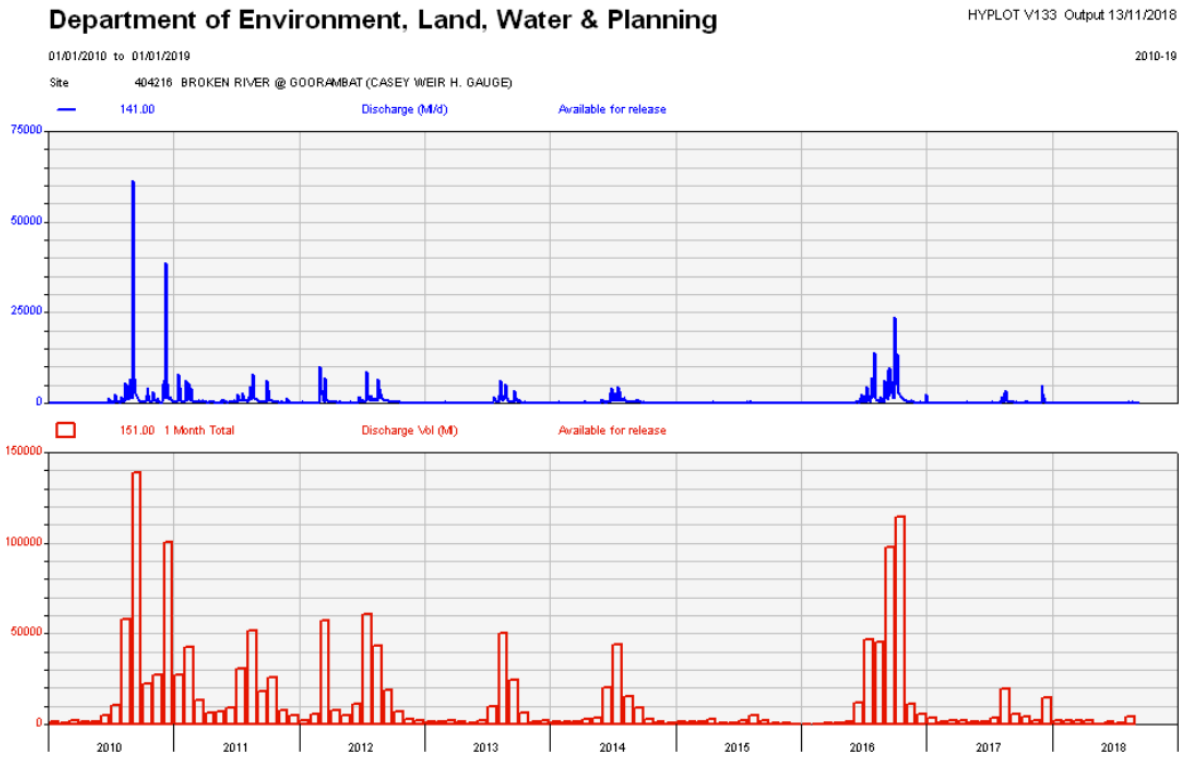
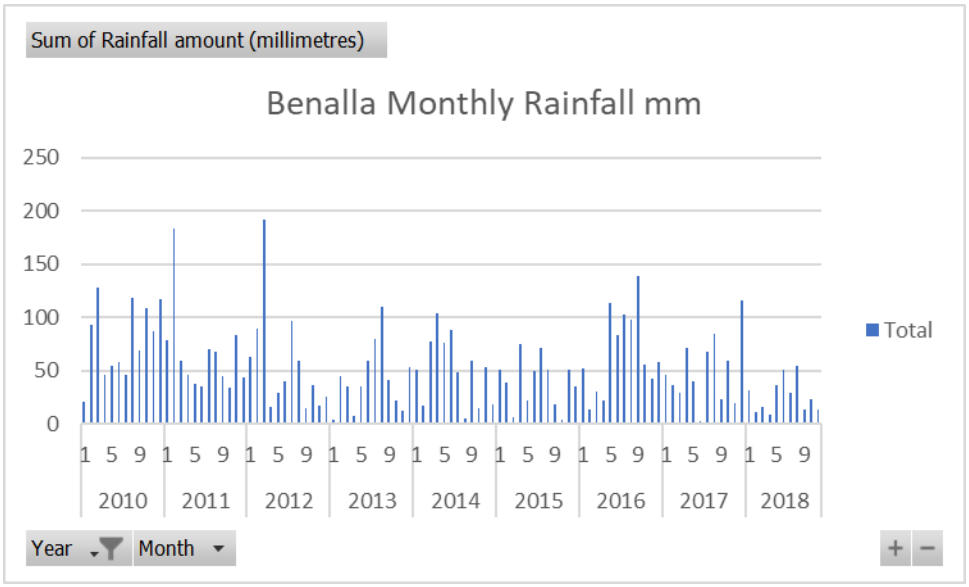


Figure 5 Rainfall at Benalla 2010 to 2018 (source BOM)



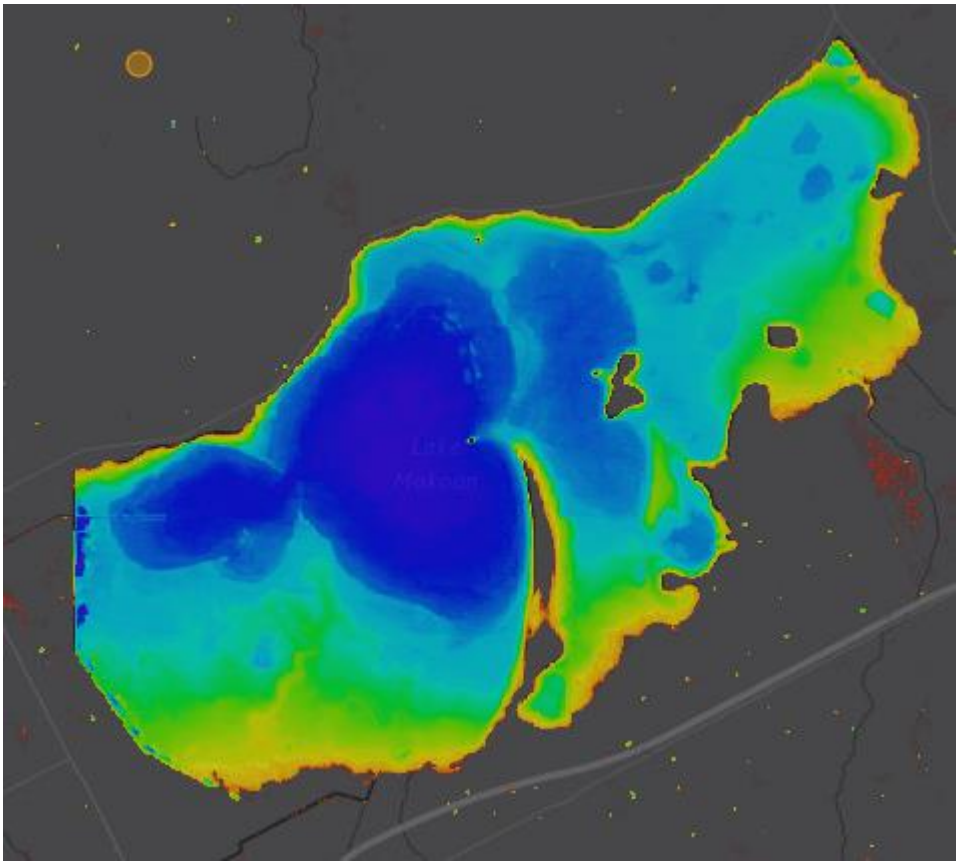
5.1 Water Observations from Space (WOFS)

WOFS (http://eos.ga.gov.au/) provides images and data showing where water has been seen in Australia from 1987 to the present. WOFS mapping shows the probability

of a site being wet from 1987 onwards (note that this will include time when the area was operated as a water storage).

Survey sites on the southern margins of the wetland (eg Bill Friday Swamp, Ashmeads Swamp, Eleven Mile Creek Woodland) are drier than other locations.

Figure 6 Winton Wetlands water observations for past 10 years – extract from WOFS showing likelihood of a pixel being water. The water frequency is shown in a colour scale from red to blue, with areas of persistent water observations shown in blue colouring, and areas of very infrequent water observation shown in red colouring.



5.2 Habitat types

Survey points comprise two broad types of habitat:

- Wetland, with varying water levels, depending on seasonal conditions
- Woodland.

No attempt has been made to further investigate habitat condition on bird species abundance and richness, except to note hydrological status of wetlands.

Issue – further investigate effects of habitat and habitat condition on bird abundance and richness

6 Climate trends

A simple method of determining climate trends is to plots deviations from mean over time. This has been done for rainfall, maximum temperature and minimum temperature. Rainfall data is available from 1900 and temperature data from 1957. Data is sourced from the BOM web site. Table 5 summarises the obvious trends that suggest the Winton Wetlands environment is drier and warmer than it was prior to about 1996. Implications for birdlife at Winton are unknown.

Table 5 summary of climate trends

Parameter	Comment
Rainfall	Figure 8 indicates a drying trend since 1996. Some interruptions from this trend, in the wet years of 2011 – 2013. This is the first major drying trend since the 1940s.
Maximum temperature	Figure 9 shows a distinct warming trend since 1996.
Minimum temperature	Figure 10 shows a warming trend from about 1987 to about 2005 with no clear tr

Figure 7 Benalla rainfall deviation from mean 1900 to 2019

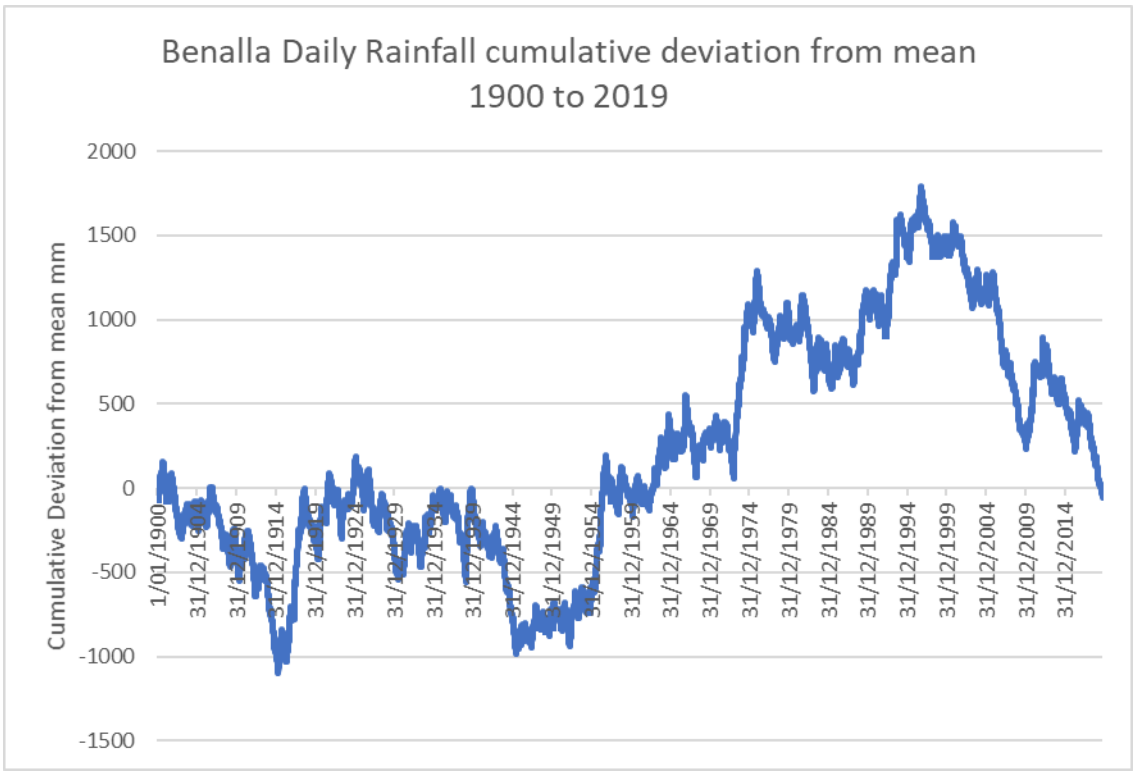


Figure 8 Benalla rainfall deviation from mean 1957 onwards.

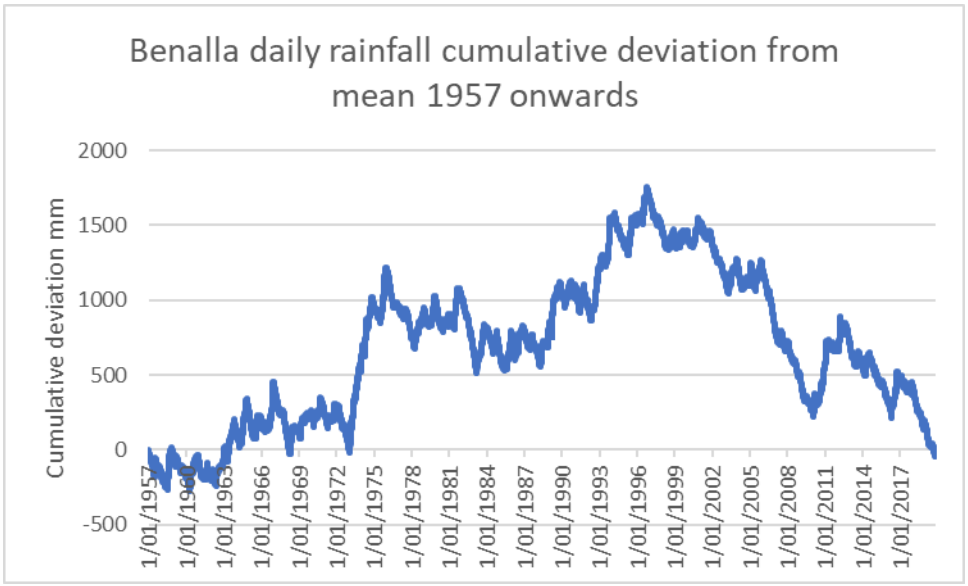


Figure 9 Benalla maximum temperature deviation from mean 1957 onwards

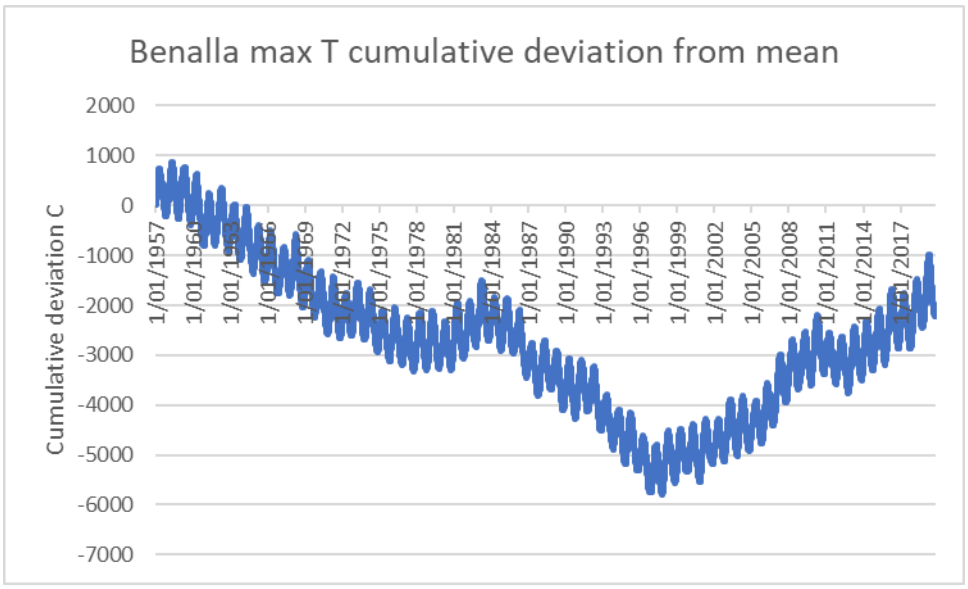
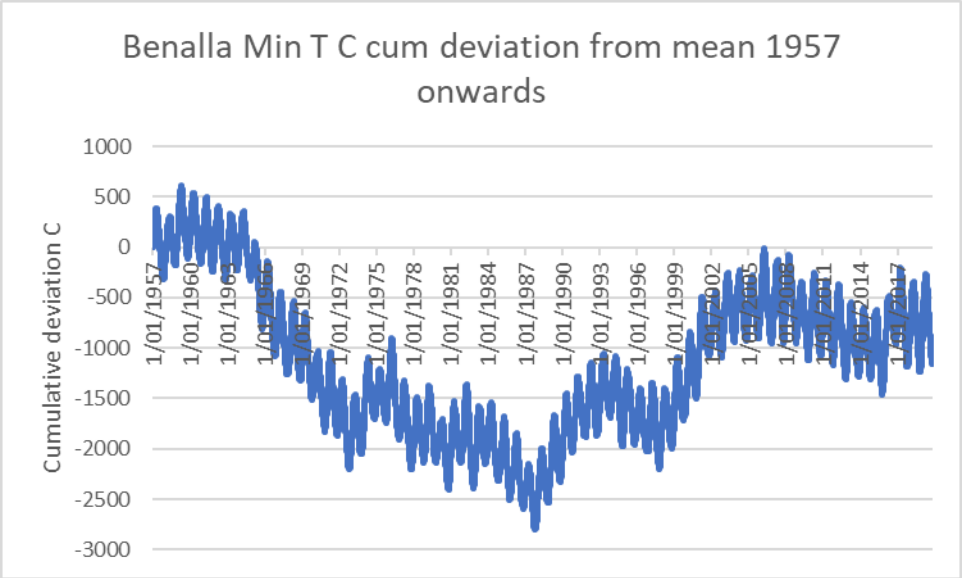


Figure 10 Benalla minimum temperature deviation from mean 1957 onwards.



7 Data analysis

To aid analysis, bird species have been loosely classified into waterbird and woodland (bush) birds.

Waterbird are reliant on free standing water for feeding or the provision of nest sites. Waterbirds were further divided into functional group based on Rogers and Ralph (2011).

Woodland/bush are everything else (recognizing that there are some difficulties with this approach (Fraser, Garrard et al. 2015))

Reporting rate is a measure (usually percentage) of the number of times a species was recorded at a site (this can be reported by site or all sites) vs the number of visits to a site.

7.1 Overview

Table 6 Data Summary

Number of species	164
Conservation status[2]	
• Least concern	155
• Near threatened	2
Waterbirds	54
Woodland (bush) birds	103
Introduced	7

[2] From BirdLife Australia (2017). The BirdLife Australia Working List of Australian Birds; Version 2.1 Downloaded from http://www.birdlife.org.au/documents/BWL-BirdLife_Australia_Working_List_v2.1.xlsx. Conservation status is based on IUCN Red List

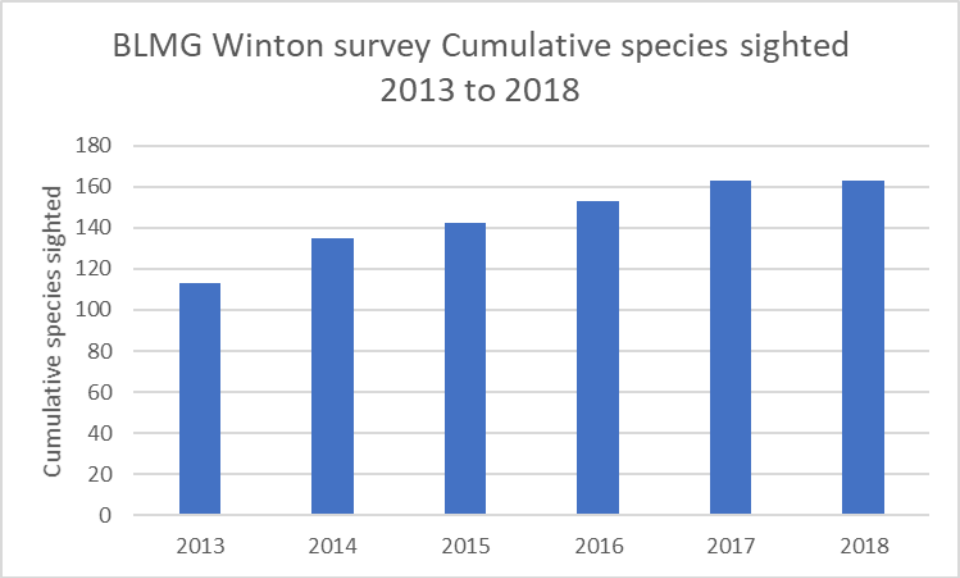
Table 7 and Figure 11 show the cumulative number of species recorded over the period 2013 to 2018. The number of new species seems to have leveled off, perhaps indicating there aren't too many more species to be sighted at the locations and times we currently survey.

The curve is expected to flatten out as new species become more and more difficult to detect (or exist).

Table 7 Cumulative bird species recorded 2013 to 2018

Year	Cumulative new species	New species each year
2013	113	113
2014	135	22
2015	142	7
2016	153	11
2017	163	10
2018	163	0

Figure 11 Cumulative bird species recorded 2013 to 2018



7.2 Conservation status

Conservation of status of birds recorded has been assessed (Table 8) against:

- Advisory List of Threatened Vertebrate Fauna in Victoria 2013 (DELWP 2013)
- Victorian Flora and Fauna Guarantee Act 1988 - Threatened List (DELWP 2018)
- EPBC Threatened fauna
- IUCN conservation status

EPBC species are threatened fauna only and does not include other EPBC criteria (eg migratory species).

Table 8 Conservation status of specific bird species.

Common species	IUCN Cons status	FFG	DELWP	EPBC
Australasian Shoveler			V	na
Black Falcon		Y	V	na
Black-chinned Honeyeater			NT	na
Brown Treecreeper			NT	na
Caspian Tern			NT	na
Diamond Firetail		Y	NT	na
Flame Robin	Near threatened			na
Freckled Duck		Y	En	na
Glossy Ibis			NT	na
Great Egret		Y		na
Grey-crowned Babbler		Y	En	na
Hardhead			V	na
Hooded Robin		Y	NT	na
Intermediate Egret		Y	En	na
Latham's Snipe			NT	na
Little Egret		Y	En	na
Musk Duck			V	na
Nankeen Night-Heron			NT	na
Pied Cormorant			NT	na
Red-necked Stint	Near threatened			na
Royal Spoonbill			NT	na
Whiskered Tern			NT	na
White-bellied Sea-Eagle		Y	V	na
White-throated Needletail		Y		na

Somewhat surprisingly only two recorded species have IUCN near threatened status. These are:

- Red-necked Stint
- Flame Robin.

Victorian Flora and Fauna Guarantee Act species and their reporting rates are shown in Table 9. Their abundance, by year, is shown in Table 10. The recent abundance of Great Egret is of interest, as is the decline in Diamond Firetails.

There are no EPBC Threatened species recorded.

Table 9 FFG bird species reporting rates

FFG Species	Reporting rate
Black Falcon	13%
Diamond Firetail	65%
Freckled Duck	22%

FFG Species	Reporting rate
Great Egret	48%
Grey-crowned Babbler	4%
Hooded Robin	9%
Intermediate Egret	9%
Little Egret	4%
White-bellied Sea-Eagle	43%
White-throated Needletail	4%

Table 10 FFG species abundance by year

Sum of Count		Year						
Common species	FFG	2013	2014	2015	2016	2017	2018	Grand Total
Black Falcon	Y	1		3				4
Diamond Firetail	Y	20	17	15	16	4		72
Freckled Duck	Y	22	52			3		77
Great Egret	Y	3	2	5		45	27	82
Grey-crowned Babbler	Y					3		3
Hooded Robin	Y			1	2			3
Intermediate Egret	Y			1		2		3
Little Egret	Y					1		1
White-bellied Sea-Eagle	Y		5	3	3	1	5	17
White-throated Needletail	Y		2					2
Grand Total		**46**	**78**	**28**	**21**	**59**	**32**	**264**

This data suggests a severe decline in Diamond Firetail numbers, although its reporting rate is high, probably due its presence in the early years of the surveys.

Great Egret numbers seem to have increased over the past few years.

Recommendation Investigate population status of Diamond Firetails

7.3 Reporting rates - annual

Table 11 shows how often species were recorded. For example, 27 species have been recorded in one year only, while 75 species have been recorded in every year the surveys have been undertaken.

Table 11 Frequency of bird record

Years 2013 to 2018	Species with that frequency
1	27
2	19
3	15
4	8
5	19
6	75

7.4 Reporting rates by survey

A species that was recorded in every survey undertaken would have a reporting rate of 100%. A species recorded once only has a reporting rate of 4.3%. Species with low recording rates might be considered rare (ie low probability of detection), while those with high reporting rates could be considered common (ie a high probability of detection).

Table 12 shows species with high and low reporting rates. (Full table in Section 15.2)

Interestingly, of the species highlighted in BECA (2006) and Barlow (2011) Australian Bittern have not been recorded, Lathams Snipe has been recorded once, while the Great Egret has a reporting rate of 47.8%.

Table 12 Selected reporting rates high to low and low to high

Common species	Reporting rate	Common species	Reporting rate
Willie Wagtail	100.0%	Australian Spotted Crake	4.3%
White-plumed Honeyeater	100.0%	Black-chinned Honeyeater	4.3%
Whistling Kite	100.0%	Brown Thornbill	4.3%
Welcome Swallow	100.0%	Buff-banded Rail	4.3%
Tree Martin	100.0%	Caspian Tern	4.3%
Superb Fairywren	100.0%	Cockatiel	4.3%
Sulphur-crested Cockatoo	100.0%	Collared Sparrowhawk	4.3%
Red-rumped Parrot	100.0%	Crimson Rosella	4.3%
Pacific Black Duck	100.0%	Eurasian Skylark	4.3%
Noisy Miner	100.0%	Glossy Ibis	4.3%
Nankeen Kestrel	100.0%	Golden Whistler	4.3%
Magpie-lark	100.0%	Grey-crowned Babbler	4.3%
Grey Teal	100.0%	Latham's Snipe	4.3%
Galah	100.0%	Little Egret	4.3%
Eastern Rosella	100.0%	Nankeen Night-Heron	4.3%
Common Starling	100.0%	Plumed Whistling-Duck	4.3%
Brown Treecreeper	100.0%	Red-necked Stint	4.3%
Brown Falcon	100.0%	Sharp-tailed Sandpiper	4.3%
Australian Shelduck	100.0%	Silvereye	4.3%
Australian Raven	100.0%	Spotted Pardalote	4.3%
Australian Magpie	100.0%	Stubble Quail	4.3%
White-faced Heron	95.7%	Tawny Frogmouth	4.3%
Masked Lapwing	95.7%	White-bellied Cuckooshrike	4.3%
Little Pied Cormorant	95.7%	White-throated Needletail	4.3%
Little Corella	95.7%	Yellow-faced Honeyeater	4.3%
Laughing Kookaburra	95.7%	Australian King-Parrot	8.7%
Grey Shrikethrush	95.7%	Dollarbird	8.7%
Crested Pigeon	95.7%	Double-banded Plover	8.7%
Black-faced Cuckooshrike	95.7%	Eastern Yellow Robin	8.7%

Common species	Reporting rate	Common species	Reporting rate
Black Swan	95.7%	Fan-tailed Cuckoo	8.7%
Yellow-billed Spoonbill	91.3%	Hooded Robin	8.7%
Wedge-tailed Eagle	91.3%	Intermediate Egret	8.7%
Striated Pardalote	91.3%	Masked Woodswallow	8.7%
Straw-necked Ibis	91.3%	Musk Duck	8.7%
Restless Flycatcher	91.3%	Red-capped Plover	8.7%
Hoary-headed Grebe	91.3%	White-backed Swallow	8.7%
Golden-headed Cisticola	91.3%	White-winged Triller	8.7%
Black-fronted Dotterel	91.3%	Black Falcon	13.0%
Australian Wood Duck	91.3%	Brown-headed Honeyeater	13.0%
Australian Pelican	91.3%	Cattle Egret	13.0%
Australasian Pipit	91.3%	Fairy/Tree Martin	13.0%

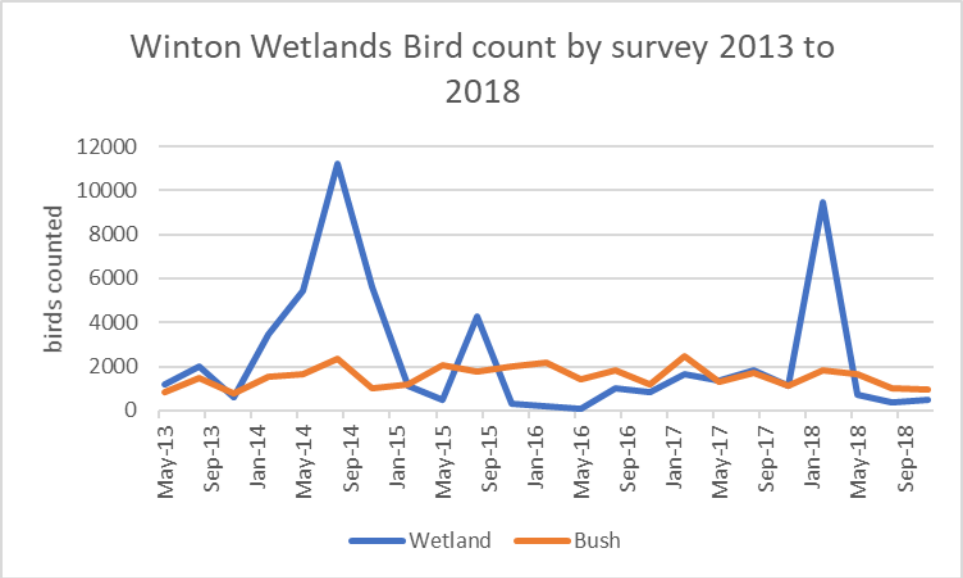
7.5 Annual patterns

Table 13 summarises species abundance and richness (ie number of different species). Numerically, waterbirds outnumber bushbirds, but bushbirds species richness is far greater than that of waterbirds. Figure 12 shows that waterbird numbers vary enormously, presumably as a result of the presence of water in the wetlands (especially 2014 and 2018). Bushbird abundance, on the other hand, is relatively constant.

Table 13 Winton Wetlands - Total abundance and richness (abundance = number recorded; richness = variety of species) from BLMG quarterly survey

	Abundance	Richness
Bushbirds	35274	103
Waterbirds	54797	54
Introduced	1370	7
All birds	90071	164

Figure 12 Bird species abundance 2013 to 2018



7.5.1 Bush birds

Figure 13 Bush bird abundance

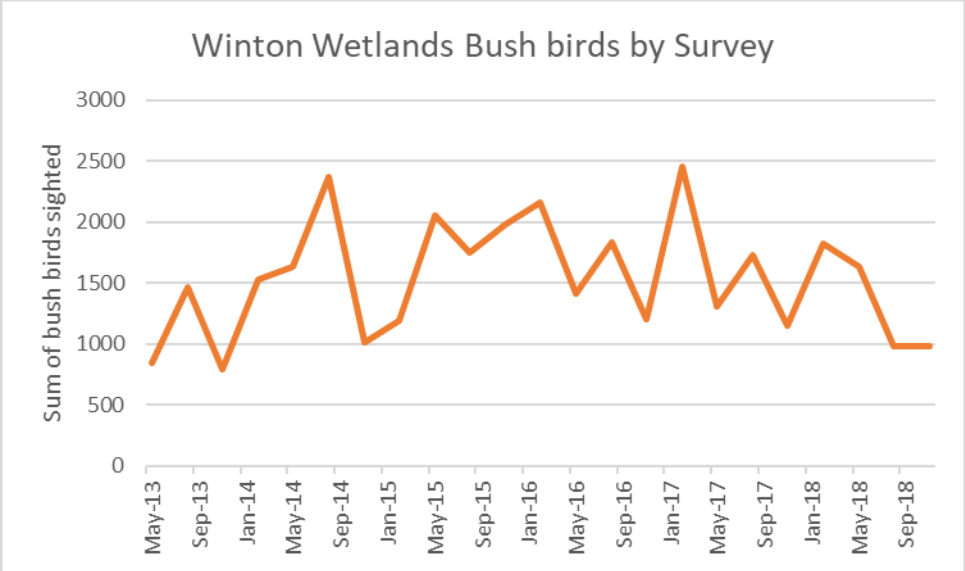


Figure 13 shows the abundance of bush birds is fairly static – between 1000 and 2000 – with some seasonal variation.

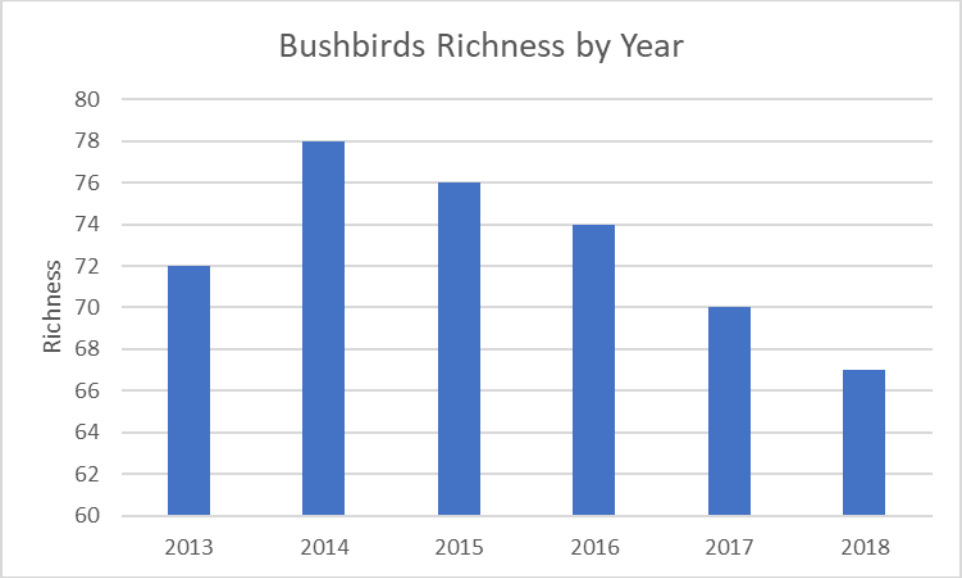
Table 14 and Figure 14 shows that bushbird richness has remained fairly constant since 2013. There is some variation, but there are no obvious major trends. The slight downwards trend from 2014 onwards will be worth watching.

Recommendation
Keep an eye on bushbird richness and abundance

Table 14 Bushbird richness by year

Year	Richness
2013	72
2014	78
2015	76
2016	74
2017	70
2018	67

Figure 14 Winton Wetlands bushbird richness by year

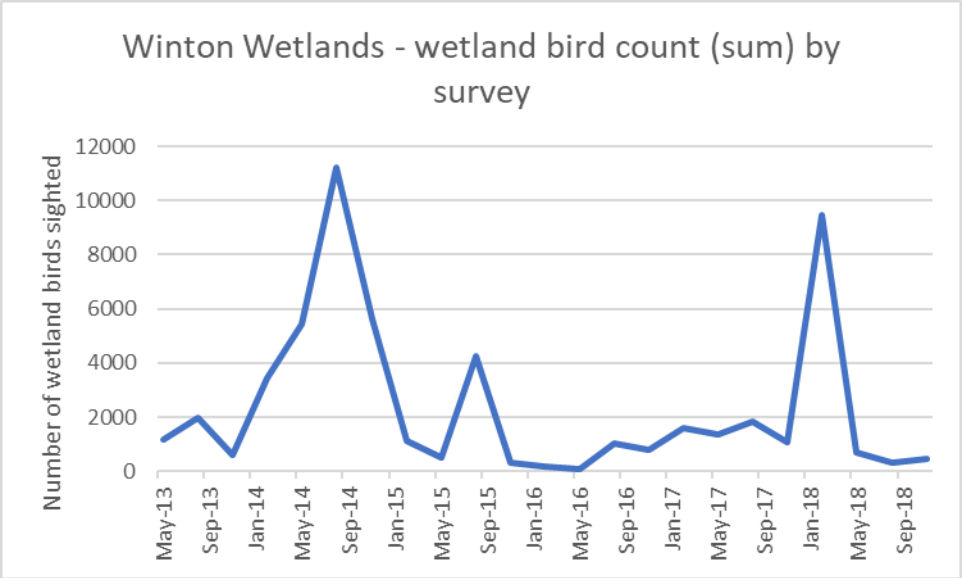


It is concluded there is no change in bushbird richness and this is further assessed in Section 10.

7.5.2 Waterbirds

The plot of waterbird abundance by year shows that the number (abundance) of waterbirds vary as water levels vary. More water equals more waterbirds.

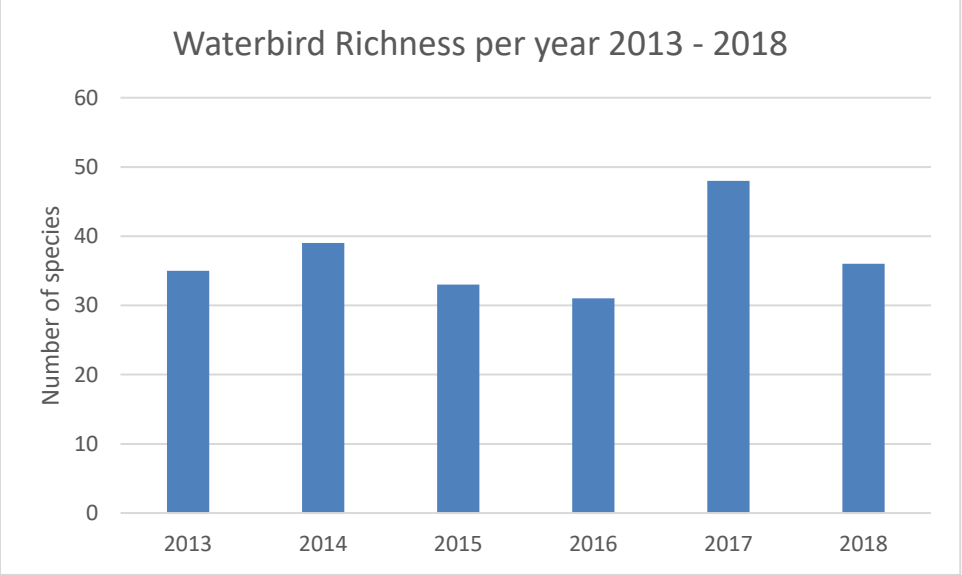
Figure 15 Waterbird abundance 2013 to 2018



7.5.3 Waterbird richness

Waterbird richness has varied a little over time. Richness in 2017 was highest with 48 species while the preceding year, 2016 had the lowest richness of 31 species. Presumably this is highly influenced by climatic conditions.

Figure 16 Waterbird richness per year 2013-2018



7.5.4 Waterbird functional group

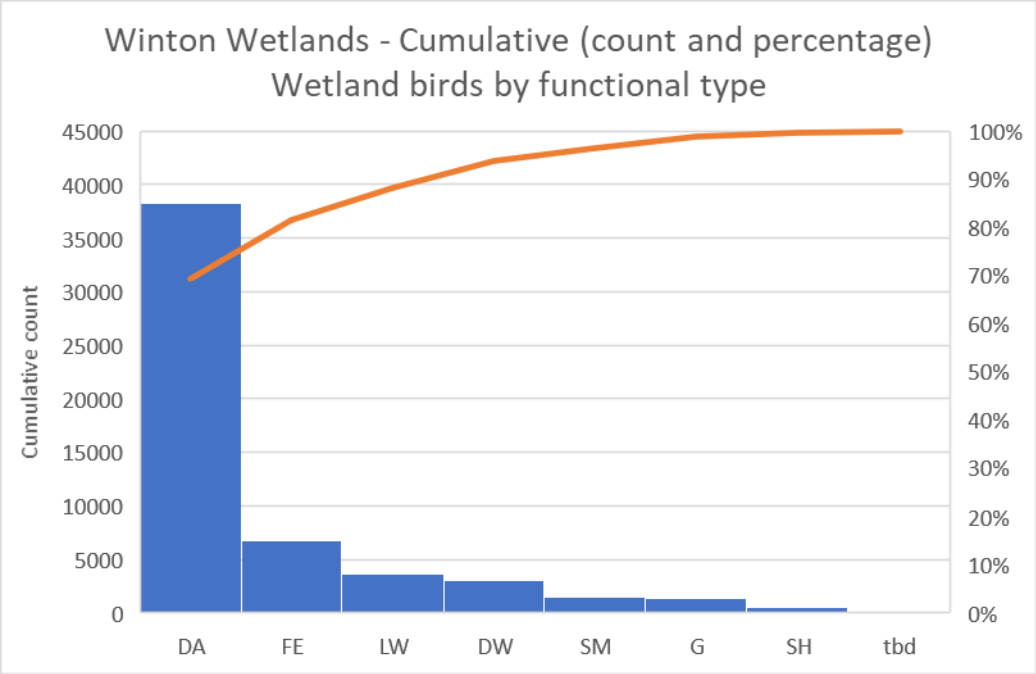
Waterbirds have been further analysed by grouping them into functional group type

Table 15 shows waterbird functional groups and the number of birds in that group. (Section 17 shows classification of waterbirds to functional groups). Figure 17 plots this data, total and cumulative total by functional group. Dabbling ducks provide over 80% of bird abundance; these include seven species, but numbers are dominated by Grey Teal which comprise 92% of records of Dabbling Ducks.

Table 15 Waterbirds by Functional Group

Functional Group	**Definitions (Rogers and Ralph 2011)**	**Row Labels**	**Total**
Dabbling ducks	Waterbirds that feed by up-ending or dabbling in shallow water.	DA	38210
Fish eater	Consume fish as their primary food source.	FE	6711
Large wader	Large long-legged birds that wade in water for food.	LW	3608
Deep water forager	Forage from deep water, but do not exhibit a preference for fish.	DW	3058
Small wader	Small long-legged birds that wade in water for food.	SM	1444
Grazing waterfowl	Herbivorous waterbirds that feed primarily by grazing from wet pasture or grasses	G	1349
Shoreline foragers	Herbivorous, carnivorous and omnivorous waterbirds that feed from the shorelines and edges of wetlands.	SH	476
Grand total			54856

Figure 17 Winton Wetlands – wetland birds by functional group (total and cumulative).



7.6 Bird abundance by site

Table 16 shows bird abundance by site and number of visits. (Simply comparing sites can be misleading as some sites were only surveyed a few times.)

For wetland birds:

- The Spit has high abundance
- The Duckpond also has high abundance
- Sites close to water have high abundance (the Spit, duck Pond, Dam Wall).

For bushbirds, abundance is much more even.

On abundance per visit basis (Table 16), the Dam Wall, Duck Pond, the Spit and the Yacht Club area have high wetland bird abundance. High bushbird per visit sites include Ashmeads Swamp, Dam Wall, Duck Pond, Greens Hill, the Spit and the Visitor and Picnic area. The bushbird to waterbird ratio indicates that sites such as 11 Mile Creek, Greens Hill, Humphries Hill have an overwhelmingly bushbird fauna (high B/W ratio) while the Dam Wall, Duck Pond, Humphries Swamp and the Spit are overwhelmingly waterbird sites. Other sites have a mixture of bush and waterbirds.

Table 16 Abundance by site (B= bushbird; W = waterbirds; x = introduced birds)

Location	Visits	B	B per visit	W	W per visit	x	x per visit	Grand Total	Total per visit	B/W ratio
Winton Wetlands	23	3017	131	1675	73	284	12	4976	216	1.801
Winton Wetlands--11 Mile Creek	11	844	77	87	8		0	931	85	9.701
Winton Wetlands--Ashmeads Swamp	17	3083	181	767	45	108	6	3958	233	4.020

Winton Wetlands--Bill Friday Swamp	23	2463	107	523	23	148	6	3134	136	4.709
Winton Wetlands--Boat Ramp Woodland	2	110	55		0		0	110	55	na
Winton Wetlands--Boggy Bridge	10	641	64	434	43		0	1075	108	1.477
Winton Wetlands--Dam Wall and Borrow Pits	23	3862	168	5950	259	370	16	10182	443	0.649
Winton Wetlands--Duck Pond	23	3544	154	6721	292	86	4	10351	450	0.527
Winton Wetlands--Greens Hill	23	3988	173	363	16	19	1	4370	190	10.986
Winton Wetlands--Humphries Hill	23	1497	65	27	1	20	1	1544	67	55.444
Winton Wetlands--Humphries Swamp	1	91	91	93	93		0	184	184	0.978
Winton Wetlands--Inlet Channel woodland	1	55	55		0	2	2	57	57	na
Winton Wetlands--Livingstons Woodland (restricted access)	12	798	67	119	10	2	0	919	77	6.706
Winton Wetlands--Northern Shore Woodland	23	1853	81	228	10	9	0	2090	91	8.127
Winton Wetlands--Outlet Channel	1	74	74	11	11	38	38	123	123	6.727
Winton Wetlands--Sadlers Swamp (restricted access)	4	491	123	57	14	30	8	578	145	8.614
Winton Wetlands--The Spit	22	4188	190	31269	1421	181	8	35638	1620	0.134
Winton Wetlands--Visitor and Picnic Area	23	3663	159	2668	116	66	3	6397	278	1.373
Winton Wetlands--Yacht Club	11	666	61	4060	369	7	1	4733	430	0.164
Grand Total	**23**	34928	1519	55052	2394	1370	60	91350	3972	0.634

7.7 Bird richness by site

Table 17 and Figure 18 show bird richness by site by year and grand total. Annual richness figure is derived by summing richness per visit; for example, at the Winton Wetlands site in 2013 Australian Bushlark was recorded in three surveys and therefore contribute a count of three towards the annual richness.

Total richness per visit varies from 38.9 at the Dam Wall down to 9.8 at Boggy Bridge. Sites with higher richness are the places to go if you want to see a variety of birds.

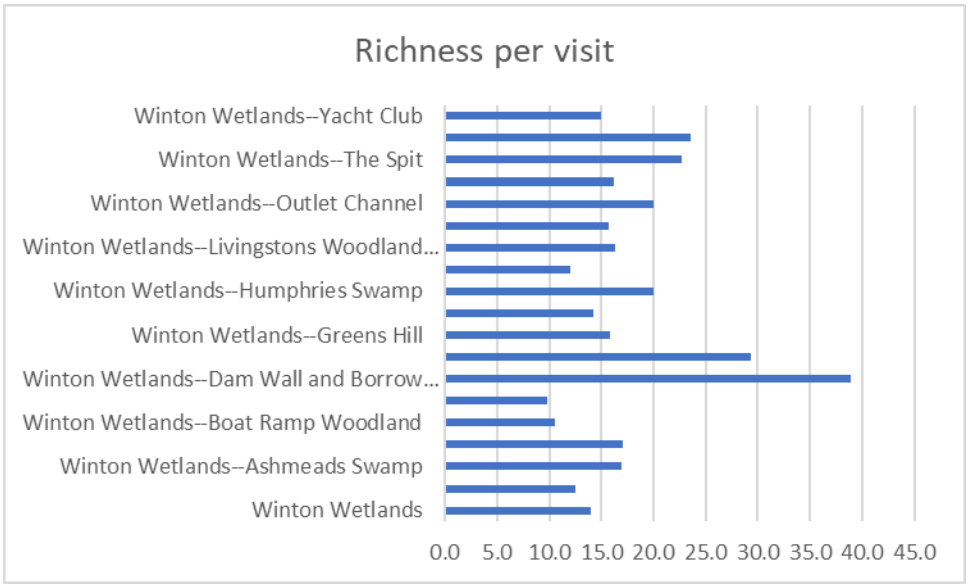
Sites with low richness could be rationalized.

Table 17 Bird richness per site (high richness per visit values highlighted; high = yellow; low = blue)

		Year							
Location	**No of Visits**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**Grand Total**	**Richness per visit**
Winton Wetlands	23	52	75	67	47	39	41	321	14.0
Winton Wetlands--11 Mile Creek	11				37	58	42	137	12.5
Winton Wetlands--Ashmeads Swamp	17		25	59	74	73	57	288	16.9
Winton Wetlands--Bill Friday Swamp	23	38	67	65	73	96	52	391	17.0
Winton Wetlands--Boat Ramp Woodland	2					15	6	21	10.5
Winton Wetlands--Boggy Bridge	10		7	15		49	27	98	9.8
Winton Wetlands--Dam Wall and Borrow Pits	23	121	140	149	149	181	154	894	38.9
Winton Wetlands--Duck Pond	23	93	110	124	91	129	128	675	29.3

		Year							
Location	**No of Visits**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**Grand Total**	**Richness per visit**
Winton Wetlands--Greens Hill	23	37	56	53	63	100	55	364	15.8
Winton Wetlands--Humphries Hill	23	42	62	66	59	57	41	327	14.2
Winton Wetlands--Humphries Swamp	1				20			20	20.0
Winton Wetlands--Inlet Channel woodland	1				12			12	12.0
Winton Wetlands--Livingstons Woodland (restricted access)	12	41	71	75	9			196	16.3
Winton Wetlands--Northern Shore Woodland	23	40	56	78	59	76	51	360	15.7
Winton Wetlands--Outlet Channel	1	20						20	20.0
Winton Wetlands--Sadlers Swamp (restricted access)	4	29	36					65	16.3
Winton Wetlands--The Spit	22	56	109	59	62	123	91	500	22.7
Winton Wetlands--Visitor and Picnic Area	23	76	61	79	83	159	83	541	23.5
Winton Wetlands--Yacht Club	11	42	51	44	27			164	14.9

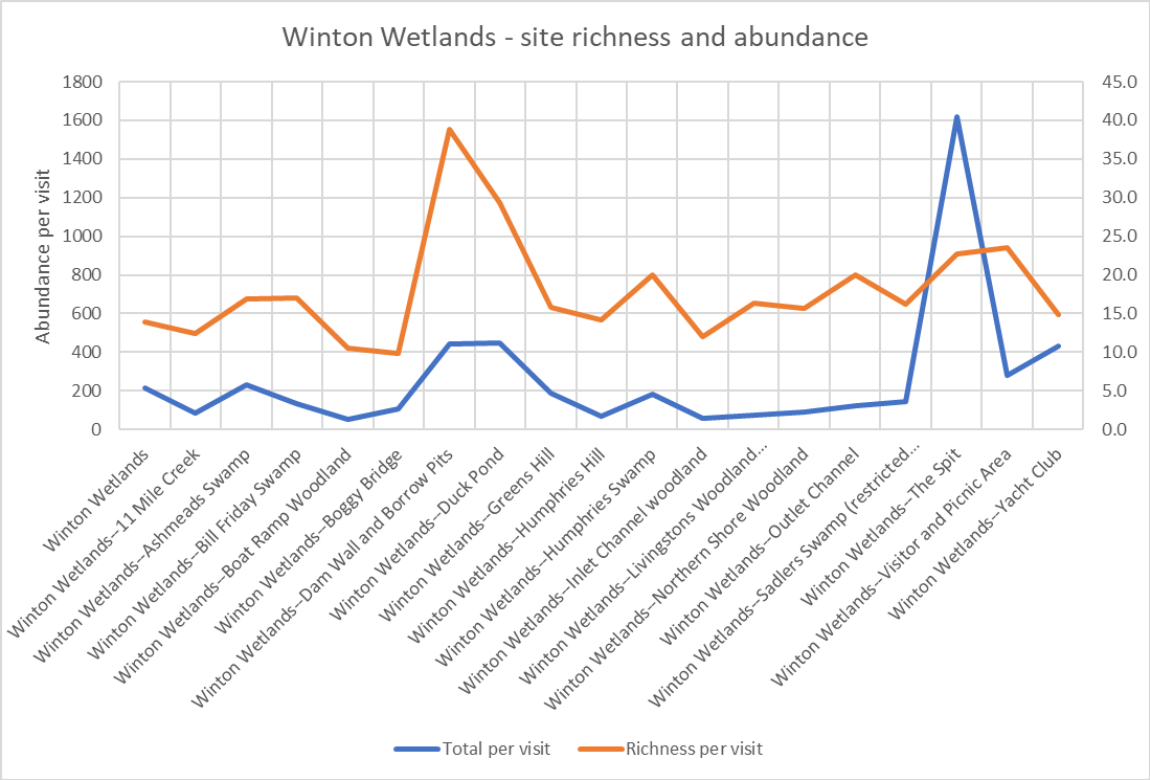
Figure 18 Richness per visit per site



7.8 Richness and abundance combined

Figure 19 combines richness and abundance figures. Sites such as the Dam Wall, Duckpond and the Spit have high values.

Figure 19 Rite richness and abundance



Recommendation
Consider utility of sites with low richness/abundance

7.9 Bushbird functional group analysis

One suggestion resulting from the presentation on Winton Wetland bird surveys was to look at bushbirds by functional (guild) group. This hadn't been attempted before due to a lack of bushbird functional group classification, but a paper (Loyn, Faragher et al. 2009) that classified a number of bushbirds into feeding and nesting guilds provided relevant information. Loyn's classification was used to assign bushbirds to functional groups. Where a bird that wasn't on Loyn's list the same schema was followed.

Table 32 1 lists bird feeding and nesting classification.

7.9.1 Loyn's classifications:

7.9.1.1 Feeding guilds

- Insectivores taking insects mainly from open air (A), bark (B), tree-canopy (C), damp ground below shrubs or low understory (DG), generally broad range of substrates (G), tall shrubs (i.e. mid-story insectivores: M), open ground among trees (OT) or open ground often not among trees (OG).

- Nectarivores taking nectar as a major part of their diet (N).
- Frugivores taking fruit as a major part of their diet (F).
- Seed-eaters taking small seeds close to the ground (SG) or feeding on seed and other food (e.g. gall insects) at all levels (ST).
- Carnivores taking vertebrate prey as a major part of their diet (V).
- Waterbirds (W).

7.9.1.2 Nesting guilds

Brood-parasites (BP); species nesting in burrows (B), on the ground (G), on ledges (L), in large or medium-sized hollows in trees (LH), in small hollows in trees (SH) or in 'normal' situations among branches of trees or shrubs (N). Migratory species that do not nest in Australia are marked X.

7.9.2 Results and discussion

All bushbirds in our Winton Wetland database were assigned to the relevant guilds and data was analysed.

Figure 20 Bushbird abundance by functional feeding group (orange line is the paredo line – cumulative %)

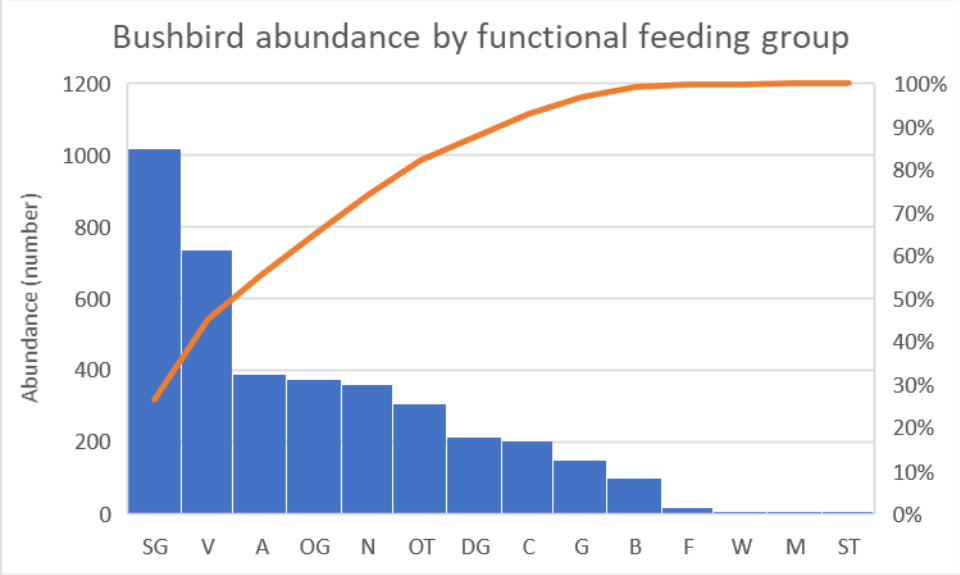


Figure 20 shows bushbird abundance is dominated by seed gatherers (SG) and carnivores (V) with lesser numbers of aerial (A), on the ground insectivores (OG) and nectivores (N). This is probably not surprising given 1) the extensive grassland areas that could provide seeds and 2) the high number of raptors present.

Figure 21 Bushbird richness by feeding functional group

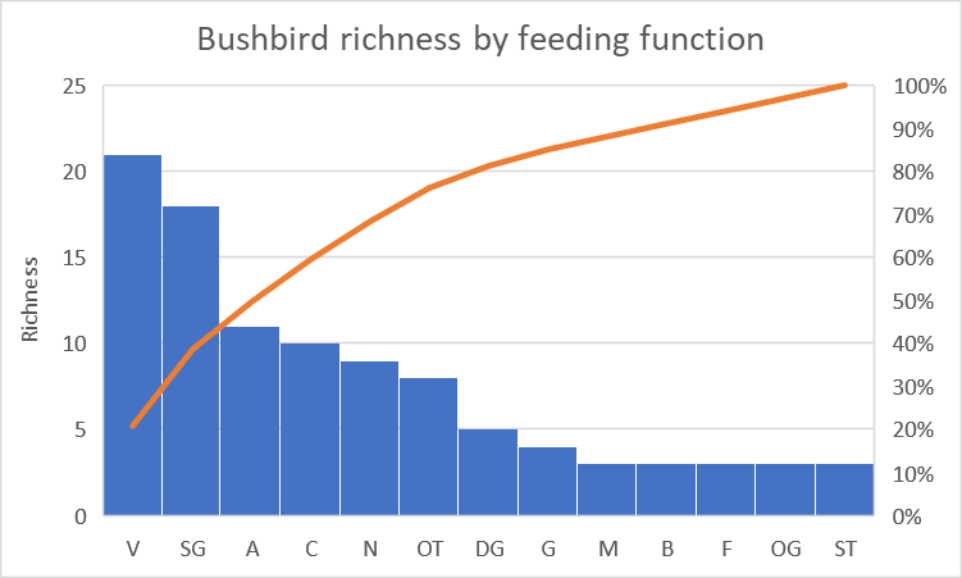


Figure 21 shows that richness is spread across a range of feeding functional groups with no particular group dominating although carnivores (V) and seed gatherers (SG) are well represented.

Figure 22 Bushbird abundance by nesting functional group

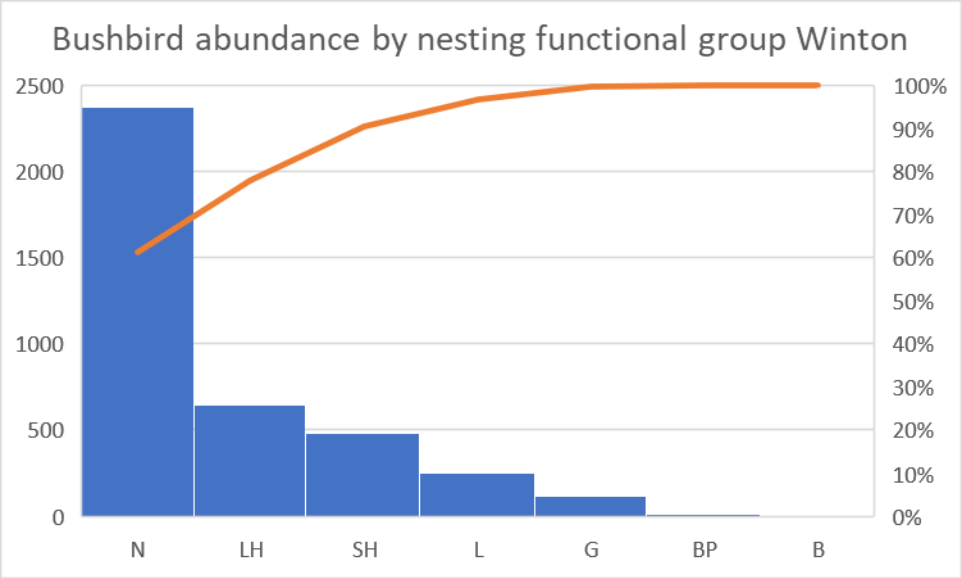


Figure 22 shows that abundance is dominated (60%) by birds that nest amongst branches of trees and shrubs (N). Hollow utilising species (LH and SH) make up a much less abundant proportion (about 15% each), which is somewhat surprising given the vast numbers of hollows present in dead trees at Winton Wetlands.

Figure 23Bushbird richness by functional feeding group

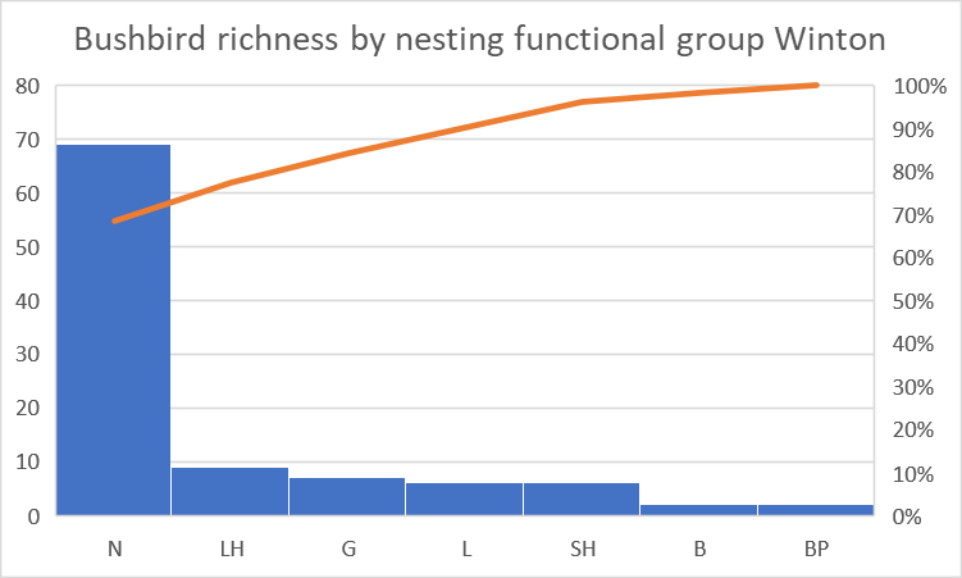


Figure 23 shows that richness is dominated (65%) by birds that nest among branches of trees and shrubs. The balance is made up of small proportions of other nesting groups.

7.9.3 Annual trends

Table 18 gives abundance and richness of birds by nesting function group by year. Each year is classified wet or dry according to the slope of the rainfall cumulative deviation for mean shown in Figure 8. It could be that in dry years, cockatoos & starlings (hollow nesters) will dominate. But in some wet years, cockatoo and starling numbers are dwarfed by waterbird numbers, hence the hollow nesters may not dominate.

Abundance of LH seem to have increased (78 to ~120)over time. SH have also increased in abundance (54 to 80).

Richness – possible decline in N; nothing else is obvious.

Table 18 Abundance and richness of bushbird by nesting functional group (NFG) against wet/dry year

Nesting FG		L		B		BP		G		LH		N		SH	
		A	R	A	R	A	R	A	R	A	R	A	R	A	R
2013	D	28	3			2	1	19	5	78	7	298	51	54	5
2014	D	49	4	1	1	1	1	23	6	103	5	409	54	78	6
2015	D	49	5	1	1	2	1	18	4	104	6	465	54	86	5
2016	W	42	5					14	5	111	7	400	51	82	6
2017	D	42	5	2	1	6	1	24	5	127	5	430	48	97	5
2018	D	37	4	1	1	1	1	15	6	123	6	369	44	83	5

7.10 Raptors

A feature of visits to Winton Wetlands is the presence of an abundance of raptors. Table 19 shows raptor richness and abundance. Thirteen raptors can be found; Brown Falcon, Nankeen Kestrel, Wedge-tail Eagle and Whistling Kites are common. There does not appear to be any annual trends in abundance. The continued presence of White Bellied Sea Eagles is significant.

Table 19 Raptor richness and abundance

		Abundance						
		Year						
Common species	**Function2**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**Grand Total**
Australian Hobby	R	1	3		2	4	5	15
Black Falcon	R	1		3				4
Black Kite	R	5	6	8	3	3	1	26
Black-shouldered Kite	R	4	9	10	5		3	31
Brown Falcon	R	24	39	70	42	39	45	259
Brown Goshawk	R		1	2	1	2	1	7
Collared Sparrowhawk	R				1			1
Little Eagle	R	1	5	4	3	3		16
Nankeen Kestrel	R	10	28	30	24	28	19	139
Peregrine Falcon	R	2	3	3		2	4	14
Spotted Harrier	R	4	2	1	4	1		12
Swamp Harrier	R	7	2	5		8	6	28
Wedge-tailed Eagle	R	11	10	19	9	18	18	85
Whistling Kite	R	30	51	30	44	58	40	253
White-bellied Sea-Eagle	R		5	3	3	1	5	17

7.11 "Gainers" and "losers"

A cursory eye-balling of the species abundance by year data (Table 30) suggests there may be species that have gained abundance (gainers) over time and others that have lost abundance (losers) over time. These are summarized in Table 20.

Gainers include introduced species of Common Starling, House Sparrow and Noisy Miner, in addition to Eastern Rosella and Great Egret.

It is likely the increase in Great Egret numbers is due to favorable wetland conditions (ie plenty of water in the wetlands). Numbers might be expected to decline during dry conditions.

Losers include Diamond Firetail, Red-capped Plover and Scarlet Robin.

The apparent decline of Red-capped Plover may be due to changes in wetland extent.

Table 20 Potential gainers (G) and losers (L)

Common species	2013	2014	2015	2016	2017	2018	G or L
Common Starling	73	182	98	161	216	313	G
Eastern Rosella	45	82	97	86	160	128	G
Great Egret	3	2	5		45	27	G
House Sparrow	3	9	9	22	19	64	G
Noisy Miner	11	28	91	65	110	86	G
Diamond Firetail	20	17	15	16	4		L
Red-capped Plover	16	2					L
Scarlet Robin	7	4	1		1		L

Tzaros (2017) in a bird survey of sandhill woodland in northern Victoria includes a list of threatened and declining birds. Not all of these are expected to be found at Winton but it provides a useful comparison of "decliners" across the region. This comparison suggests the Winton Wetlands could be an important habitat for some species considered at risk.

Table 21 Comparison of Tzaros threatened/declining species with BLMG reporting rates

Tzaros classification	**Species**	**BLMG Winton reporting rate**	**Comment**
Threatened species	Superb Parrot	-	Not expected at Winton
	Dusky Woodswallow	73.9	
	Scarlet Robin	26.1	
	Grey-crowned Babbler	4.3	
	Hooded Robin	8.7	
	Varied Sittella	-	A few eBird records
	Flame Robin	52.2	
	Little Eagle	43.5	
Declining species	Brown Treecreeper	100	
	Red-caped Robin	21.7	
	Brown-headed Honeyeater	-	
	Jacky Winter	30.4	
	Western Gerygone	13	
	Southern Whiteface	-	A few eBird records (not recent)
	White-browed Babbler	78	
	Restless Flycatcher	91	
	Crested Shrike-tit	47.8	

Tzaros classification	Species	BLMG Winton reporting rate	Comment
	Fuscous Honeyeater	-	A few eBird records
	Painted Button-quail	-	A few eBird records
	Apostlebird	-	Not expected to be seen

7.12 Victorian Temperate Woodland Bird Community

The FFG listed Victorian Temperate Woodland Bird Community has been defined as a suite of bird species, mainly associated with drier woodlands on the slopes and plains north of the Great Dividing Range, that seem to have declined markedly in numbers since records began. The 24 species in this group are the Painted Button-quail (Turnix varia), Bush Stone-curlew (Burhinus grallarius), Red-tailed Black-Cockatoo (Calyptorhynchis banksii graptogyne), Little Lorikeet (Glossopsitta pusilla), Superb Parrot (Polytelis swainsonii), Swift Parrot (Lathamus discolor), Turquoise Parrot (Neophema pulchella), Barking Owl (Ninox connivens), *Brown Treecreeper*[3] (Climacteris picumnus victoriae), Speckled Warbler (Chthonicola sagittata), *Western Gerygone* (Gerygone fusca), Regent Honeyeater (Anthochaera = Xanthomyza phrygia), Yellow-tufted Honeyeater (Lichenostomus melanops meltoni), Fuscous Honeyeater (Lichenostomus fuscus), *Black-chinned Honeyeater* (Melithreptus gularis), *Brown-headed Honeyeater* (Melithreptus brevirostris), Painted Honeyeater (Grantiella picta), *Jacky Winter* (Microeca fascinans), *Red-capped Robin* (Petroica goodenovii), *Hooded Robin* (Melanodryas cucullata*), Grey-crowned Babbler* (Pomatostomus temporalis), Ground Cuckoo-shrike (Coracina maxima), Apostlebird (Struthidea cinerea), and *Diamond Firetail* (Stagonopleura guttata). The distributions of these birds differ between species. Many are closely associated with (but not exclusive to) northern Victorian drier woodlands dominated by box, stringybark, ironbark, yellow gum or river red gum eucalypts, or by buloke or cypress-pine. Many such woodlands originally had an open structure, a light shrubby understorey, a grassy ground cover with fallen timber, an abundance of tree-hollows and other nesting sites, and available sources of seeds, nectar and insects throughout the year. Since European settlement, most of these woodlands have been cleared for agricultural production, or fragmented and degraded, greatly reducing the resources available to these birds; many sites now also have cats and foxes present.

Nine of the 24 species making up Victorian Temperate Woodland Bird Community occur at Winton Wetlands (cf the statement in Barlow (2011) that the Flora and Fauna Guarantee listed *Victorian Temperate Woodland Bird Community* occurs in woodland zones at Winton Wetlands.)

[3] Italics indicates presence (as recorded in BLMG quarterly survey) at Winton Wetlands.

7.13 Introduced birds

There are a number of introduced birds at Winton Wetlands. Table 23 shows the abundance of introduced birds at monitoring sites over time. Numbers of these birds seem to be increasing. Ashmeads Swamp, Bill Friday's Swamp, the Dam Wall and The Spit have high numbers. Numbers are dominated by Common Starling, with lesser numbers of Common Mynah and House Sparrow.

Table 22 Introduced species recorded at Winton Wetlands

Common Blackbird
Common Myna
Common Starling
Domestic goose sp. (Domestic type)
Eurasian Skylark
European Goldfinch
House Sparrow

Table 23 Introduced birds by location and year

Location	2013	2014	2015	2016	2017	2018	Grand Total
Winton Wetlands	18	6	2		12	246	284
Winton Wetlands--Ashmeads Swamp		4	15	20	33	36	108
Winton Wetlands--Bill Friday Swamp	1	70	17	26	4	30	148
Winton Wetlands--Dam Wall and Borrow Pits	53	44	68	134	42	29	370
Winton Wetlands--Duck Pond	6	12	16	3	43	6	86
Winton Wetlands--Greens Hill				4	11	4	19
Winton Wetlands--Humphries Hill	2	3		10		5	20
Winton Wetlands--Inlet Channel woodland				2			2
Winton Wetlands--Livingstons Woodland (restricted access)			2				2
Winton Wetlands--Northern Shore Woodland	3				2	4	9
Winton Wetlands--Outlet Channel	38						38
Winton Wetlands--Sadlers Swamp (restricted access)	7	23					30
Winton Wetlands--The Spit		34	11	10	86	40	181
Winton Wetlands--Visitor and Picnic Area	14	4	2	6	38	2	66
Winton Wetlands--Yacht Club	1	6					7
Grand Total	**143**	**206**	**133**	**215**	**271**	**402**	**1370**

8 Comparison with benchmarks

To gain an appreciation of the significance of Winton as a bird site Winton Wetland bird data can be compared with similar indicators from other sites. This isn't a straight

forward exercise because survey methods, habitat types and a range of other factors are variable. However, such comparisons can give useful information.

8.1 Sandhill woodlands

Tzaros (2017) reports on bird surveys of sandhill woodland of northern Victoria and southern NSW. Reporting rate and abundance are provided for a wide range of woodland species (not all of which are found at Winton Wetlands). These provide a comparison point against reporting rates and abundances at Winton Wetlands.

Table 24 shows BLMG Winton and Tzaros (2017) reporting rates for species common to both surveys. There is substantial variation; some of BLMG highs are Tzaros' lows and vice versa; others are roughly similar.

Table 24 BLMG reporting rates compared with Tzaros (2017) rates

Common species	BLMG Reporting rate %	Tsaros (2017) reporting rate %(rounded)
Australian Magpie	100.0%	24
Australian Raven	100.0%	10
Black-faced Cuckooshrike	95.7%	16
Brown Falcon	100.0%	3
Brown Goshawk	30.4%	3
Brown Treecreeper	100.0	23
Common Bronzewing	21.7	23
Crested Pigeon	95.7	7
Crested Shrike-tit	47.8	3
Diamond Firetail	65.2	3
Dusky Woodswallow	73.9	8
Eastern Rosella	100.0	36
Flame Robin	52.2	1
Galah	100.0	29
Golden Whistler	4.3	4
Grey Butcherbird	60.9	5
Grey Fantail	34.8	34
Grey Shrikethrush	95.7	29
Grey-crowned Babbler	4.3	6
Hooded Robin	8.7	8
Horsfield's Bronze-Cuckoo	17.4	3
Intermediate Egret	8.7	23
Little Friarbird	26.1	8
Magpie-lark	100.0	2
Mistletoebird	26.1	18
Noisy Friarbird	21.7	13
Noisy Miner	100.0	16
Olive-backed Oriole	26.1	3

Common species	BLMG Reporting rate %	Tsaros (2017) reporting rate %(rounded)
Peaceful Dove	73.9	16
Pied Butcherbird	69.6	9
Pied Currawong	39.1	1
Rainbow Bee-eater	13.0	15
Red Wattlebird	73.9	2
Red-capped Robin	21.7	40
Red-rumped Parrot	100.0	29
Restless Flycatcher	91.3	3
Rufous Whistler	30.4	41
Sacred Kingfisher	47.8	8
Scarlet Robin	26.1	3
Silvereye	4.3	20
Spotted Pardalote	4.3	4
Striated Pardalote	91.3	50
Sulphur-crested Cockatoo	100.0	8
Superb Fairywren	100.0	56
Tree Martin	100.0	7
Wedge-tailed Eagle	91.3	4
Weebill	21.7	49
Western Gerygone	13.0	9
Whistling Kite	100.0	3
White-browed Babbler	78.3	7
White-browed Woodswallow	13.0	2
White-plumed Honeyeater	100.0	41
White-throated Treecreeper	13.0	17
White-winged Chough	87.0	13
Willie Wagtail	100.0	30
Yellow Thornbill	30.4	67.5
Yellow-rumped Thornbill	87.0	60.0

8.2 Broad wetland surveys

Kingsford, Bino et al. (2013) have regularly aerially surveyed waterbirds at Lake Mokoan as part of broad waterbird surveys. These surveys were undertaken in October-November each year. Results are shown in Figure 24.

(Comparing the Kingsford surveys with BLMG survey is a little unfair since pre-2010 the area was operated as a water storage (although water levels had been low for a number of years), surveys were undertaken by air and the survey years are different).

They noted that piscivores, herbivores and ducks dominated the functional groups, occurring in similar number, contrasting with relatively few large wading birds or shorebirds. Numbers of waterbirds breeding varied considerably and remained low for most years except 2009. Most of the breeding was confined to only one or two species (mostly Black Swans).

Table 25 compares Kingsford and BLMG waterbird richness and abundance. This indicates that BLMG surveys have reported higher wetland bird richness and abundance.

Issues – suggests BLMG survey had substantial utility

Table 25 Comparison of waterbird richness and abundance – Kingsford et al vs BMLG

	Kingsford et al	**BLMG Quarterly survey**
Richness	Up to about 20 species, but more regularly 10 to 15	54 species
Abundance	Up to 6000 (1986, 2011) but more usually around 4,000	Up to 11,000 birds (2014), 9000 (2018) around 1,000 when wetland is dry

Richness = number of species

Abundance = number of individuals

Figure 24 Waterbirds Abundance and Richness at Lake Mokoan 1983 to 2012 (from (Kingsford, Bino et al. 2013)

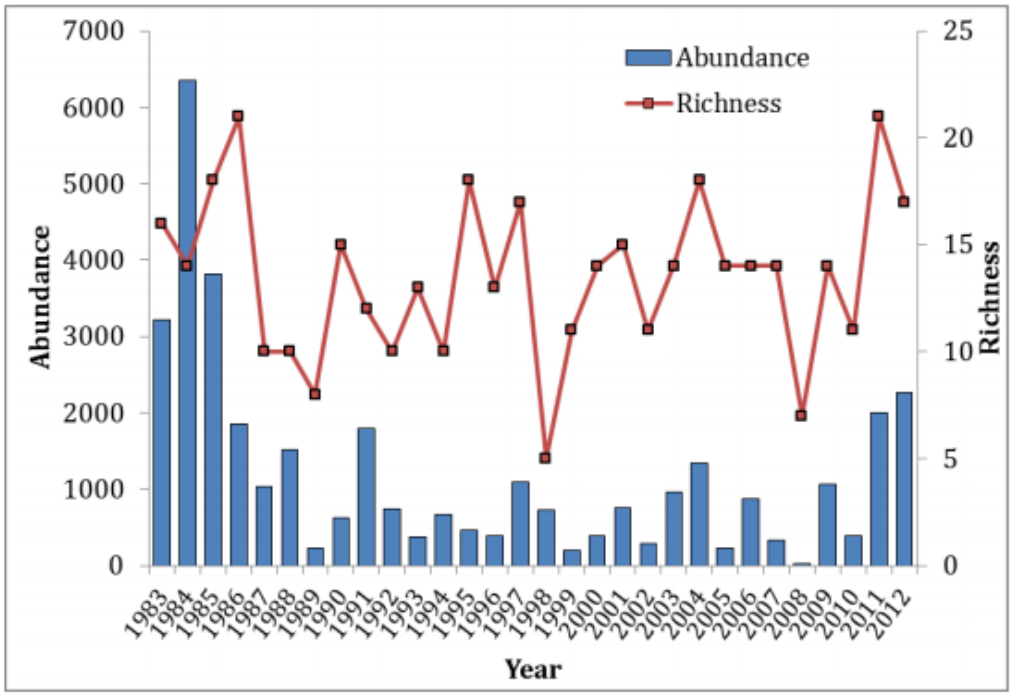
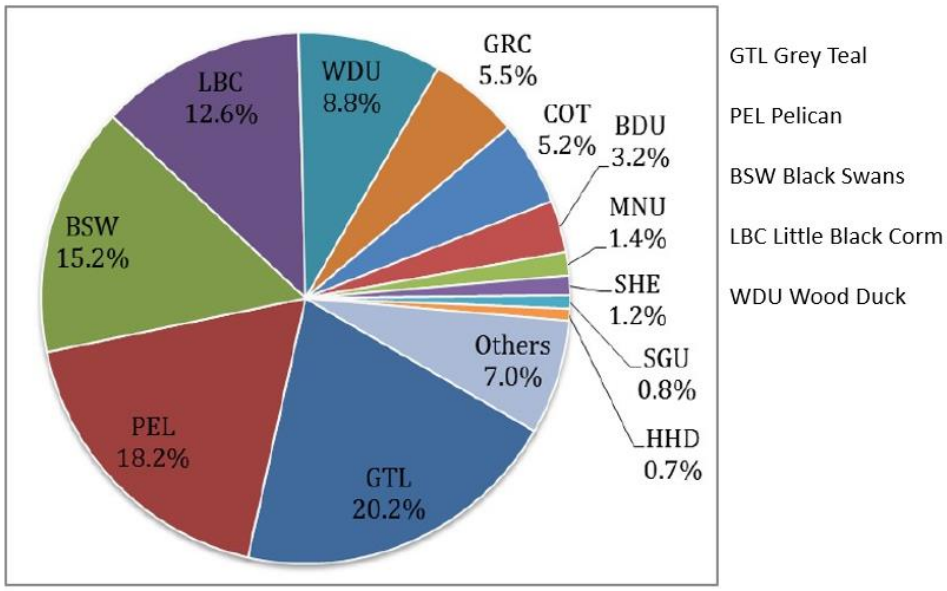


Figure 113. Abundance and species richness of waterbirds surveyed on Lake Mokoan, during annual surveys of the Murray-Darling Basin, 1983-2012.

Figure 25 Relative composition of 12 most common waterbird species, Lake Mokoan 1983-2012 ((Kingsford, Bino et al. 2013)

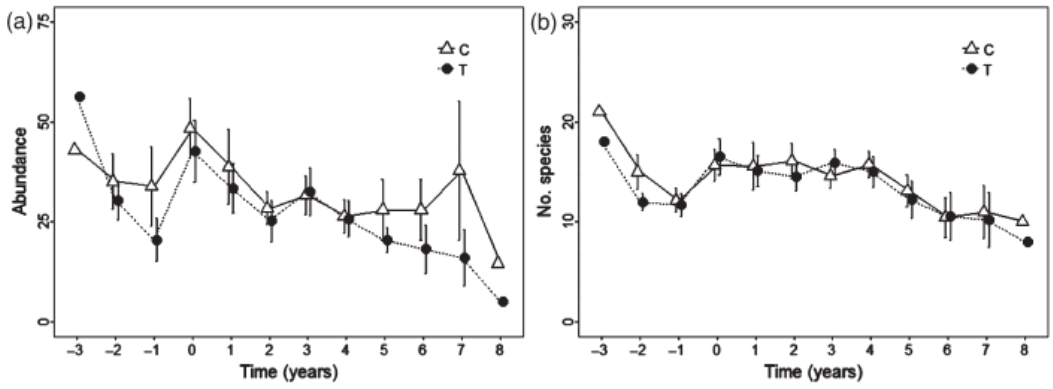


Relative composition of 12 most common waterbird species, Lake Mokoan, 1983 -2012

Richard Kingsford et al

8.3 Bush birds

Hale, Reich et al. (2015) assessed the degree to which fencing, livestock exclusion, and replanting of riparian zones affected avian assemblages in massively cleared landscapes. They measured the change in vegetation characteristics and abundances of native birds for up to 8 years after works were completed. at three creeks in the southern Murray–Darling Basin in southeastern Australia, including Faithful Creek (–36.619 S, 145.523 E) in the Goulburn River catchment. They include plots of abundance and richness of birds species over time. B) indicates that richness was of the order of 10-15 species, suggesting that overall Winton Wetland bushbird richness is very high at 103.



Radford, Bennett et al. (2005) present empirical data on the species richness of woodland dependent birds collected systematically from 24 landscapes (each 100 km$_2$)

that sample a gradient in habitat cover from <2% to 60%. Nine of their study landscapes were in the Goulburn Broken catchment. They derived three measures of richness (see Fig below). These figures show bird species richness varied from around 10 to 50 species. Again, this indicates that Winton Wetland bushbird abundance is very high.

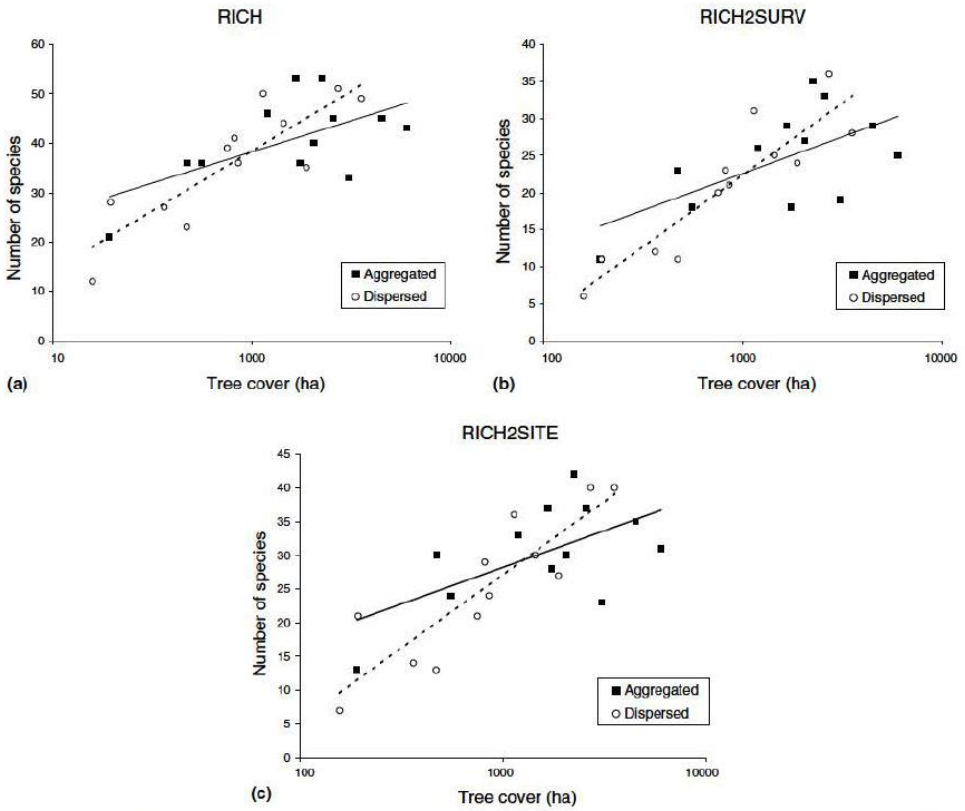


Fig. 3. Graphical representation of analysis of co variance for the relationship between species richness, tree cover (co variate) and habitat configuration: (a) RICH, (b) RICH2SURV and (c) RICH2SITE. Filled squares and solid lines represent aggregated landscapes; open circles and broken lines are dispersed landscapes.

Connecting Country (2014) report on a bird monitoring program in the Mount Alexander Shire (near Castlemaine). This monitoring program has been designed to measure the changes in the woodland bird community (if any) that are occurring as a result of on-ground restoration works occurring across parts of the Mount Alexander region. They present plots of average number of species recorded (Figure 26). Species richness at intact vegetation sites is reported to be around 16, suggesting that Winton Wetland bushbird richness is high.

Watson (2017) reported the total richness of woodland-dependent birds at 4 reserves north of Albury to be 39, 13, 30 and 18 again suggesting that Winton Wetland bushbird richness is high.

Figure 26 Bird monitoring results– Mt Alexander Sire (from Connecting Country (2014))

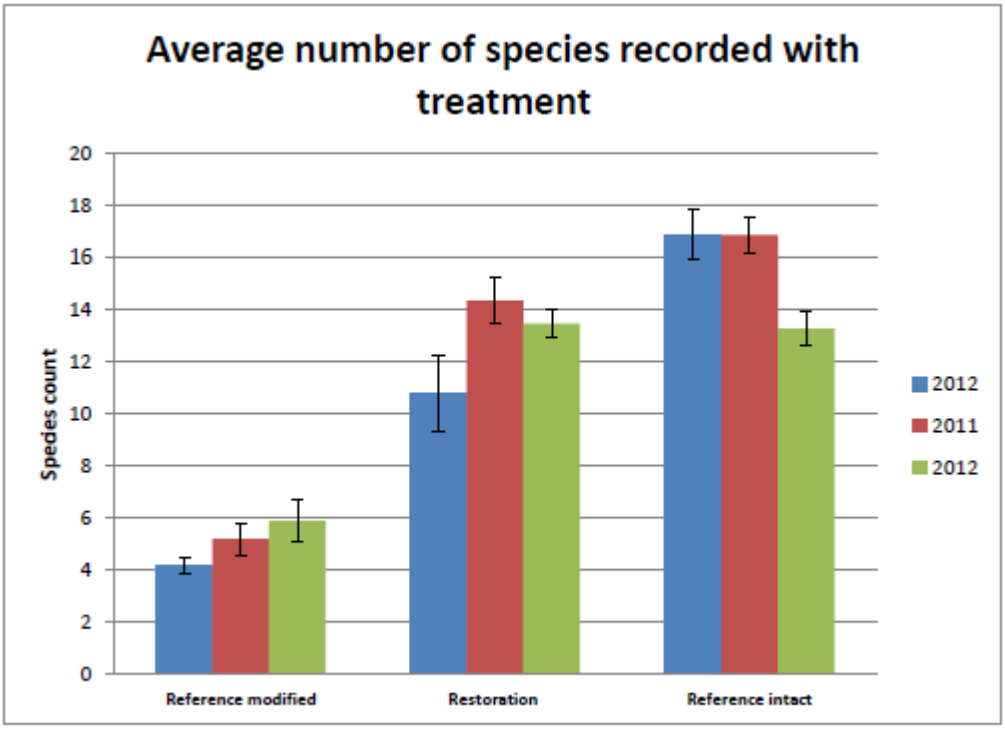


Figure 3.1 Average number of bird species (±standard error) recorded across surveys within treatment types each year.

8.4 Conclusion:

Winton Wetland bushbird richness appears to be high when compared with data from other sources. Waterbirds richness and abundance is highly variable, depending on seasonal conditions.

This could be worth further investigation

9 Comparison with full eBird Winton data set

The full eBird data set for Winton Wetlands (accessed from www.ebird.org 26/11/2018) includes survey results from BLMG and other eBird contributors over a long period of time and indicates the presence of 191 species. Of the 191 species, there are 33 species not recorded by BLMG during the quarterly surveys, but seen by others (Table 27).

It is unlikely that all of these species will ever be recorded by BLMG since some are nocturnal, have specific habitat requirements not present at BLMG sites or are extremely rare or locally extinct.

Issue – are we ever likely to see all of these species – probably not – some are nocturnal, others water dependent; some may be locally extinct

BLMG species not in eBird are shown in Table 26 (probably because we have recorded them at specific WW sites rather than the Winton Wetlands hot spot.

Table 26 Species recorded by BLMG and not in WW eBird list

Brown Thornbill
Buff-banded Rail
Little Egret

Table 27 Birds recorded in eBird but not yet seen by BLMG

Barn Owl
Black-eared Cuckoo
Blue-billed Duck
Brolga
Buff-rumped Thornbill
Chestnut-rumped Thornbill
Common Greenshank
Fuscous Honeyeater
Gull-billed Tern
Lewin's Rail
Little Lorikeet
Long-billed Corella
Marsh Sandpiper
Musk Lorikeet
Pacific Golden-Plover
Pacific Swift
Painted Buttonquail
Painted Honeyeater
Pallid Cuckoo
Purple-crowned Lorikeet
Red-backed Kingfisher
Rock Dove
Shining Bronze-Cuckoo
Southern Boobook
Southern Whiteface
Speckled Warbler
Spotless Crake
Spotted Dove
Swift Parrot
Varied Sittella
White-naped Honeyeater
White-winged Black Tern
Wood Sandpiper

10 Assessment against monitoring plan

10.1 Significant birds

Barlow (2011) included a table of significant bird species at Winton Wetlands (see Section 3). Table 28 compares "significant" species noted by Barlow with BLMG survey results. Ten "Barlow" species have not been recorded, while others have been recorded a few times (eg Caspian Tern, Latham's Snipe, Little Egret, Nankeen Night Heron) and some are very regularly sighted (eg Freckled Duck, Hardhead, Australian Shoveller). Interestingly Grey-crowned Babblers are not included in this list.

For some species, eg Lathams Snipe, Bittern, targeted surveys may be required.

Recommendaton
Review Barlow list
Consider targeted surveys for some species

Table 28 Significant bird species reported in (Barlow 2011) compared with BLMG results

Common name	Comment (from (Barlow 2011)	Comparison with BLMG quarterly survey result
Brown Quail	Notable breeding population	48% reporting rate
Red-chested Button Quail	VBA record (1977)	No sightings
Pied Cormorant	Uncommon in northern Vic	13% reporting rate
Whiskered Tern	300+ birds breeding 2009/10 (Ramsey 2011)	13%
White-winged Black Tern	New record for NE Vic (Ramsey 2011) seen late 2009	No sighting
Caspian Tern	Rarely recorded in NE Vic, 1 bird sighted near boat ramp March 2011 (Ramsey, 2011)	4%
Gull-billed Tern	New record for NE Vic (Ramsey 2011), seen late 2009	No sighting
Latham's Snipe	Possibly nationally – internationally significant site	4.3% Seen at two survey points
Bush Stone-curlew	VBA record, call-back yielded no response in 2010 (Hamilton 2010). Not considered present	No sighting
Brolga	Resident, poss breeding (Ramsey 2011)	No sighting
Royal Spoonbill	c. ten birds late 2009 (Ramsey 2011)	35%
Little Egret	VBA record (1980)	4%
Intermediate Egret	Critically endangered in Vic, thought to be breeding at Winton – highly significant (Carr & Conole, 2006; Ramsey, 2011)	8.7%
Great Egret	Significant number of birds sighted at Winton, thought to be breeding (Carr & Conole 2006; Ramsey 2011)	47.8%
Cattle Egret	VBA record (1980)	13%
Nankeen Night Heron	Possibly (colonial) breeding at 11 Mile Wetland (Ramsey 2011)	4.3%
Australasian Bittern	Tbc (recorded by Carr & Conole 2006) – nationally significant	Not sighted
Little Bittern	Probably site of State – National significance for this species (Carr & Conole, 2006), not previously recorded here	Not sighted
Freckled Duck	Approx. 90 birds sighted near Duck Pond, considered to be breeding here (Carr and Conole 2006)	21.7%

Common name	Comment (from (Barlow 2011)	Comparison with BLMG quarterly survey result
Hardhead	Common and breeding (Ramsey 2011)	78.3%
Blue-billed Duck	Significant record (Hamilton 2010), no details	Not sighted
Musk Duck	Regularly sighted when water levels high	8.7%
Australasian Shoveller	100s of birds late 2009, breeding at Friday's Swamp (Ramsey 2011)	82.6%
Spotted Harrier	VBA record (1977)	30.4%
White-bellied Sea-eagle	Breeding at Winton, poss two pairs (Ramsey 2011)	43.5%
Turquoise Parrot	VBA record (1996)	Not sighted
Black-eared Cuckoo	VBA record (1980)	Not sighted
Hooded Robin	Breeding along Northern Shore (Ramsey 2011)	8.7%
White-throated Needle-tail	200+ birds in 2010/11 (Ramsey 2011)	4.3%

10.2 Assessment against monitoring objectives

Barlow (2011) makes a number of statements relevant to monitoring. Some of these statements can be assessed (Table 29) using information gleaned from BLMG quarterly surveys.

Table 29 Assessment of monitoring statements

Monitoring statement	Assessment
ongoing efforts to restore and enhance habitat is the recommended approach for increasing the diversity and abundance of bird populations	*Diversity and abundance doesn't seem to be changing much; therefore habitat hasn't been restored and enhanced? This might take time or alternatively habitat has already reached some sort of equilibrium state (given that much of the area has had relatively little disturbance since about 1990).*
Monitoring of the Latham's Snipe population should be conducted over a number of years (5+) when habitat conditions are suitable to ascertain the value of Winton Wetlands for this species	*Few Latham's Snipe recorded. Either not present or habitat is not suitable in most years (investigate further) or we're not going to the right places* *Investigate further -targeted survey?*
The populations and breeding success of colonial breeding species (e.g. Intermediate Egret, Great Egret, Nankeen Night-heron, Pied Cormorant and Little Black Cormorant) should also be documented on an annual basis to determine the importance of Winton Wetlands as a breeding site for colonial waterbirds.	*BLMG doesn't indicate breeding success – haven't seen breeding events. Increase in population of Great Egret may indicate breeding.* *Very few Intermediate Egret recorded. Nankeen Night-Heron present in one year only (2017 – water present?).* *Pied cormorant not abundant; Little Black Cormorant present in high numbers only when water and fish present (2017).* ***Can't say that Winton Wetlands is an important breeding site for colonial waterbirds.***
Monitoring of the status of state or nationally threatened bird fauna should also be undertaken to provide evidence supporting the value of Winton Wetlands. These include the White-bellied Sea-eagle, the Australasian Bittern, Freckled Duck (both nationally endangered), Australasian Shoveler and the	*White Bellied Sea Eagle regularly recorded (in low numbers).* *Australasian Bittern not recorded.* *Freckled Duck reported in some years (water related)* *Australasian Shoveler recorded in all years.*

Monitoring statement	Assessment
Hardhead, two species of duck listed as vulnerable in Victoria.	*Hardhead recorded in reasonable numbers*
Winton Wetlands will, if not already, become a popular venue for bird watching enthusiasts. In consultation with one local bird observer (Michael Ramsey), a list of sites has been mapped (Figure 20) that provides the best bird watching opportunities at Winton Wetlands	*eBird records provide hotspot information; attract visitors*
Improvement in ecological function at Winton Wetlands will be indicated by, amongst other things, an increase in the structural diversity of woodland vegetation, indicated by an increase in the diversity and abundance of woodland birds	*Not seeing this at BLMG sites – no clear trend.* *This might take time or alternatively habitat has already reached some sort of equilibrium state (given that much of the area has had relatively little disturbance since about 1990)*

11 Other opportunities

Bird (Regent Honeyeater and Grey-crowned Babbler) conservation programs in the Lurg area are encouraging development of habitat and corridors north through Winton, to the Winton Wetlands and the Chesney Hills.

The BLMG survey has potential to be adapted to provide data to measure the success or otherwise of these programs, especially for the Grey-crowned Babbler.

Recommendation
Review BLMG Winton Wetland sites to determine their utility for other bird conservation programs)

12 Utility of the BLMG survey

From the information presented above it is apparent that the BLMG Winton Wetland surveys are providing valuable information about the dynamics of bird (bush and wetland) populations.

The data collected is freely available to researchers.

The BLMG surveys span a reasonable period of time and provide a unique data set against which monitoring/reclamation objectives can be assessed.

13 Conclusions and Recommendations

13.1 Conclusion

The BLMG bird surveys are useful and can provide valuable information about birds at Winton.

BLMG bird surveys provide a useful source of data to assess ecological function at Winton Wetlands

Winton Wetlands are an important bird site – both waterbirds and bushbirds

13.2 Recommendations

- Further investigate effects of habitat and habitat condition on bird abundance and richness
- Investigate population status of Diamond Firetails
- Keep an eye on bushbird richness and abundance
- Consider rationalizing sites with low richness/abundance
- Review Barlow list
- Consider targeted surveys for some species eg Lathams Snipe, Australasian Bittern and species not seen to date
- Investigate changes in diversity and abundance against habitat restoration and enhancement – is it happening?
- Review BLMG Winton Wetland sites to determine their utility for other bird conservation programs)
- Consider targeted survey for those Barlow and eBird species not seen to date.
- Review data annually and every 5 years or so
- This has been a first pass data review. More detailed analysis could yield more insights

14 Bibliography and Resources

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15 Appendices

15.1 Bird abundance by year

Table 30 Bird abundance by year (Type B= Bushbird, W = waterbird; x = introduced. Shaded rows indicate loser or gainer)

		Year						
Species common name	**type**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**Grand Total**
Australasian Bushlark	B		8		7		4	19
Australasian Darter	W	6	5	7	1	33	15	67
Australasian Grebe	W	9	17	4	15	117	57	219
Australasian Pipit	B	12	24	24	16	15	16	107
Australasian Shoveler	W	56	125	73	13	13	63	343
Australasian Swamphen	W	38	21	26	14	48	16	163
Australian Hobby	B	1	3		2	4	5	15
Australian King-Parrot	B				2		4	6
Australian Magpie	B	112	168	219	212	116	181	1008
Australian Pelican	W	708	626	54	34	1456	408	3286
Australian Raven	B	27	51	133	61	30	78	380
Australian Reed Warbler	W	37	23	26	43	33	17	179
Australian Shelduck	W	66	62	112	26	299	214	779
Australian Spotted Crake	W		1					1
Australian White Ibis	W	6	37	31	29	55	23	181
Australian Wood Duck	W	92	101	73	77	144	80	567
Black Falcon	B	1		3				4
Black Kite	B	5	6	8	3	3	1	26
Black Swan	W	62	847	332	98	113	31	1483
Black-chinned Honeyeater	B				1			1
Black-faced Cuckooshrike	B	13	23	30	23	41	18	148
Black-fronted Dotterel	W	37	43	22	23	20	22	167
Black-shouldered Kite	B	4	9	10	5		3	31
Black-tailed Nativehen	W	4					24	28
Blue-faced Honeyeater	B	1	2		3		1	7
Brown Falcon	B	24	39	70	42	39	45	259
Brown Goshawk	B		1	2	1	2	1	7
Brown Quail	B	10	1	10	9	7	5	42
Brown Songlark	B	2	1			1	3	7
Brown Thornbill	B		8					8
Brown Treecreeper	B	45	45	48	58	28	35	259
Brown-headed Honeyeater	B	3	1	6				10
Buff-banded Rail	W					1		1

		Year						
Species common name	**type**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**Grand Total**
Caspian Tern	W		2					2
Cattle Egret	W					13		13
Chestnut Teal	W	10	6	30	27	14	30	117
Cockatiel	B	5						5
Collared Sparrowhawk	B				1			1
Common Blackbird	x	4	1	3				8
Common Bronzewing	B			4	1	1		6
Common Myna	x	24	14	21	24	34	19	136
Common Starling	x	73	182	98	161	216	313	1043
Crested Pigeon	B	6	22	39	35	24	14	140
Crested Shrike-tit	B	1	4	10	5	1	2	23
Crimson Rosella	B				1			1
Diamond Firetail	B	20	17	15	16	4		72
Dollarbird	B	1		2				3
Domestic goose sp. (Domestic type)	x	8			4	2		14
Double-banded Plover	W	4				1		5
Dusky Moorhen	W				8	15	1	24
Dusky Woodswallow	B	13	13	48	45	65	24	208
Eastern Rosella	B	45	82	97	86	160	128	598
Eastern Yellow Robin	B		1	1				2
Eurasian Coot	W	199	115	14	78	474	113	993
Eurasian Skylark	x				4			4
European Goldfinch	x	31		2			6	39
Fairy Martin	B		59	85	16	27	38	225
Fairy/Tree Martin	B				1	30		31
Fan-tailed Cuckoo	B	2	1					3
Flame Robin	B	12	28	21	17	7	47	132
Freckled Duck	W	22	52			3		77
Galah	B	106	210	305	164	249	271	1305
Glossy Ibis	W					1		1
Golden Whistler	B		1					1
Golden-headed Cisticola	B	11	25	43	21	22	7	129
Great Cormorant	W	3	10	3	2	144	6	168
Great Crested Grebe	W				3	32		35
Great Egret	W	3	2	5		45	27	82
Grey Butcherbird	B	1		5	5	6	5	22
Grey Fantail	B	1	4	3	1	4		13
Grey Shrikethrush	B	22	34	29	19	22	26	152
Grey Teal	W	1811	20457	3640	555	997	7673	35133
Grey-crowned Babbler	B					3		3
Hardhead	W	63	197	37	161	82	39	579

		Year						
Species common name	**type**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**Grand Total**
Hoary-headed Grebe	W	163	102	86	20	193	127	691
Hooded Robin	B			1	2			3
Horsfield's Bronze-Cuckoo	B			2		6	1	9
House Sparrow	x	3	9	9	22	19	64	126
Intermediate Egret	W			1		2		3
Jacky Winter	B	4	5	4				13
Latham's Snipe	W					2		2
Laughing Kookaburra	B	9	16	17	21	15	24	102
Little Black Cormorant	W	7	8	63	10	299	33	420
Little Corella	B	80	326	292	505	316	391	1910
Little Eagle	B	1	5	4	3	3		16
Little Egret	W					1		1
Little Friarbird	B		1	7	3	1	1	13
Little Grassbird	B	8	3	1	1		2	15
Little Pied Cormorant	W	5	8	33	9	150	25	230
Little Raven	B		86	92	475	62	70	785
Magpie-lark	B	39	92	100	64	163	40	498
Masked Lapwing	W	21	84	63	22	52	15	257
Masked Woodswallow	B	6					3	9
Mistletoebird	B	1	2	3	2	2		10
Musk Duck	W		1			2		3
Nankeen Kestrel	B	10	28	30	24	28	19	139
Nankeen Night-Heron	W					21		21
Noisy Friarbird	B		8	2		4		14
Noisy Miner	B	11	28	91	65	110	86	391
Olive-backed Oriole	B		2	1	1	3	1	8
Pacific Black Duck	W	112	932	202	159	145	348	1898
Peaceful Dove	B	7	10	3	3	9	7	39
Peregrine Falcon	B	2	3	3		2	4	14
Pied Butcherbird	B	4	5	9	7	5	9	39
Pied Cormorant	W					5	2	7
Pied Currawong	B	1	1	18	13	1	21	55
Pied Stilt	W	4	1000	35	4	27	17	1087
Pink-eared Duck	W	117	47	347	26	66	39	642
Plumed Whistling-Duck	W					3		3
Rainbow Bee-eater	B			4		6	6	16
Red Wattlebird	B	14	56	37	18	42	4	171
Red-browed Finch	B	6	4			2	5	17
Red-capped Plover	W	16	2					18
Red-capped Robin	B	1	1		2		1	5
Red-kneed Dotterel	W	11	10	2		21	17	61

		Year						
Species common name	**type**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**Grand Total**
Red-necked Avocet	W		62				39	101
Red-necked Stint	W	3						3
Red-rumped Parrot	B	249	389	283	247	299	297	1764
Restless Flycatcher	B	12	12	30	13	9	9	85
Royal Spoonbill	W		1	3		7	5	16
Rufous Songlark	B	12	22	33	2	21	8	98
Rufous Whistler	B	1		3		3	5	12
Sacred Kingfisher	B	4	6	10	16	16	10	62
Scarlet Robin	B	7	4	1		1		13
Sharp-tailed Sandpiper	W					2		2
Silver Gull	W	5	279	204	8	90	24	610
Silvereye	B			2				2
Spotted Harrier	B	4	2	1	4	1		12
Spotted Pardalote	B		1					1
Straw-necked Ibis	W	38	25	628	577	220	1339	2827
Striated Pardalote	B	15	14	51	12	42	18	152
Stubble Quail	B				1			1
Sulphur-crested Cockatoo	B	948	2201	2589	2658	2679	1116	12191
Superb Fairywren	B	179	272	237	236	178	263	1365
Swamp Harrier	B	7	2	5		8	6	28
Tawny Frogmouth	B				3			3
Tree Martin	B	245	341	497	281	403	787	2554
Wedge-tailed Eagle	B	11	10	19	9	18	18	85
Weebill	B		4	7		2		13
Welcome Swallow	B	249	1118	382	431	546	571	3297
Western Gerygone	B	1	1	1				3
Whiskered Tern	W		50			309		359
Whistling Kite	B	30	51	30	44	58	40	253
White-backed Swallow	B			8				8
White-bellied Cuckooshrike	B		1					1
White-bellied Sea-Eagle	W		5	3	3	1	5	17
White-breasted Woodswallow	B	8	16	49	87	64	26	250
White-browed Babbler	B	4	25	28	10	39	16	122
White-browed Woodswallow	B	49			12		34	95
White-faced Heron	W	21	73	29	45	106	52	326
White-fronted Chat	B	14	26	6	22	28	14	110
White-necked Heron	W	6	59	6	11	76	13	171
White-plumed Honeyeater	B	164	177	310	181	308	172	1312
White-throated Needletail	B		2					2
White-throated Treecreeper	B		4		1			5
White-winged Chough	B	14	28	61	28	54	47	232

		Year						
Species common name	**type**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**Grand Total**
White-winged Triller	B	2		3				5
Willie Wagtail	B	54	112	123	107	74	79	549
Yellow Thornbill	B	16			3	2	29	50
Yellow-billed Spoonbill	W	67	340	65	23	34	54	583
Yellow-faced Honeyeater	B				2			2
Yellow-rumped Thornbill	B	22	30	45	36	15	66	214
Zebra Finch	B	51	22	90	52	22	30	267
Grand Total		7057	32509	13287	8925	12839	16733	91350

15.2 Reporting rate

Table 31 Reporting rates – all species

Common species	**Reporting rate**	**Tsaros (2017) reporting rate (rounded)**
Australasian Bushlark	21.7%	
Australasian Darter	78.3%	
Australasian Grebe	73.9%	
Australasian Pipit	91.3%	
Australasian Shoveler	82.6%	
Australasian Swamphen	87.0%	
Australian Hobby	34.8%	
Australian King-Parrot	8.7%	
Australian Magpie	100.0%	24
Australian Pelican	91.3%	
Australian Raven	100.0%	10
Australian Reed Warbler	47.8%	
Australian Shelduck	100.0%	
Australian Spotted Crake	4.3%	
Australian White Ibis	65.2%	
Australian Wood Duck	91.3%	
Black Falcon	13.0%	
Black Kite	43.5%	
Black Swan	95.7%	
Black-chinned Honeyeater	4.3%	
Black-faced Cuckooshrike	95.7%	16
Black-fronted Dotterel	91.3%	
Black-shouldered Kite	47.8%	
Black-tailed Nativehen	17.4%	
Blue-faced Honeyeater	17.4%	
Brown Falcon	100.0%	3

Common species	Reporting rate	Tsaros (2017) reporting rate (rounded)
Brown Goshawk	30.4%	3
Brown Quail	47.8%	
Brown Songlark	17.4%	
Brown Thornbill	4.3%	
Brown Treecreeper	100.0%	23
Brown-headed Honeyeater	13.0%	
Buff-banded Rail	4.3%	
Caspian Tern	4.3%	
Cattle Egret	13.0%	
Chestnut Teal	39.1%	
Cockatiel	4.3%	
Collared Sparrowhawk	4.3%	
Common Blackbird	30.4%	
Common Bronzewing	21.7%	23
Common Myna	82.6%	
Common Starling	100.0%	
Crested Pigeon	95.7%	7
Crested Shrike-tit	47.8%	3
Crimson Rosella	4.3%	
Diamond Firetail	65.2%	3
Dollarbird	8.7%	
Domestic goose sp. (Domestic type)	30.4%	
Double-banded Plover	8.7%	
Dusky Moorhen	21.7%	
Dusky Woodswallow	73.9%	8
Eastern Rosella	100.0%	36
Eastern Yellow Robin	8.7%	
Eurasian Coot	73.9%	
Eurasian Skylark	4.3%	
European Goldfinch	17.4%	
Fairy Martin	34.8%	
Fairy/Tree Martin	13.0%	
Fan-tailed Cuckoo	8.7%	
Flame Robin	52.2%	1
Freckled Duck	21.7%	
Galah	100.0%	29
Glossy Ibis	4.3%	
Golden Whistler	4.3%	4
Golden-headed Cisticola	91.3%	
Great Cormorant	60.9%	
Great Crested Grebe	17.4%	
Great Egret	47.8%	

Common species	Reporting rate	Tsaros (2017) reporting rate (rounded)
Grey Butcherbird	60.9%	5
Grey Fantail	34.8%	34
Grey Shrikethrush	95.7%	29
Grey Teal	100.0%	
Grey-crowned Babbler	4.3%	6
Hardhead	78.3%	
Hoary-headed Grebe	91.3%	
Hooded Robin	8.7%	8
Horsfield's Bronze-Cuckoo	17.4%	3
House Sparrow	78.3%	
Intermediate Egret	8.7%	23
Jacky Winter	30.4%	
Latham's Snipe	4.3%	
Laughing Kookaburra	95.7%	
Little Black Cormorant	82.6%	
Little Corella	95.7%	
Little Eagle	43.5%	
Little Egret	4.3%	
Little Friarbird	26.1%	8
Little Grassbird	26.1%	
Little Pied Cormorant	95.7%	
Little Raven	73.9%	
Magpie-lark	100.0%	2
Masked Lapwing	95.7%	
Masked Woodswallow	8.7%	
Mistletoebird	26.1%	18
Musk Duck	8.7%	
Nankeen Kestrel	100.0%	
Nankeen Night-Heron	4.3%	
Noisy Friarbird	21.7%	13
Noisy Miner	100.0%	16
Olive-backed Oriole	26.1%	3
Pacific Black Duck	100.0%	
Peaceful Dove	73.9%	16
Peregrine Falcon	43.5%	
Pied Butcherbird	69.6%	9
Pied Cormorant	13.0%	
Pied Currawong	39.1%	1
Pied Stilt	39.1%	
Pink-eared Duck	82.6%	
Plumed Whistling-Duck	4.3%	
Rainbow Bee-eater	13.0%	15

Common species	Reporting rate	Tsaros (2017) reporting rate (rounded)
Red Wattlebird	73.9%	2
Red-browed Finch	17.4%	
Red-capped Plover	8.7%	
Red-capped Robin	21.7%	40
Red-kneed Dotterel	47.8%	
Red-necked Avocet	17.4%	
Red-necked Stint	4.3%	
Red-rumped Parrot	100.0%	29
Restless Flycatcher	91.3%	3
Royal Spoonbill	34.8%	
Rufous Songlark	39.1%	
Rufous Whistler	30.4%	41
Sacred Kingfisher	47.8%	8
Scarlet Robin	26.1%	3
Sharp-tailed Sandpiper	4.3%	
Silver Gull	60.9%	
Silvereye	4.3%	20
Spotted Harrier	30.4%	
Spotted Pardalote	4.3%	4
Straw-necked Ibis	91.3%	
Striated Pardalote	91.3%	50
Stubble Quail	4.3%	
Sulphur-crested Cockatoo	100.0%	8
Superb Fairywren	100.0%	56
Swamp Harrier	43.5%	
Tawny Frogmouth	4.3%	
Tree Martin	100.0%	7
Wedge-tailed Eagle	91.3%	4
Weebill	21.7%	49
Welcome Swallow	100.0%	
Western Gerygone	13.0%	9
Whiskered Tern	13.0%	
Whistling Kite	100.0%	3
White-backed Swallow	8.7%	
White-bellied Cuckooshrike	4.3%	
White-bellied Sea-Eagle	43.5%	
White-breasted Woodswallow	73.9%	
White-browed Babbler	78.3%	7
White-browed Woodswallow	13.0%	2
White-faced Heron	95.7%	
White-fronted Chat	69.6%	
White-necked Heron	73.9%	

Common species	Reporting rate	Tsaros (2017) reporting rate (rounded)
White-plumed Honeyeater	100.0%	41
White-throated Needletail	4.3%	
White-throated Treecreeper	13.0%	17
White-winged Chough	87.0%	13
White-winged Triller	8.7%	
Willie Wagtail	100.0%	30
Yellow Thornbill	30.4%	67.5
Yellow-billed Spoonbill	91.3%	
Yellow-faced Honeyeater	4.3%	
Yellow-rumped Thornbill	87.0%	60.0
Zebra Finch	43.5%	

15.3 Functional group classification

Table 32 Functional group (feeding/nesting) classification of birds (B=bushbird; W= waterbird; X=introduced: feeding and nesting guilds as per Section 7.9)

Common Name	B or Wet	Feeding guild	Nesting guild
Australasian Bushlark	B	SG	G
Australasian Darter	W	W	
Australasian Grebe	W	W	
Australasian Pipit	B	SG	G
Australasian Shoveler	W	W	
Australasian Swamphen	W	W	G
Australian Hobby	B	V	N
Australian King-Parrot	B	ST	LH
Australian Magpie	B	OG	N
Australian Pelican	W	W	
Australian Raven	B	V	N
Australian Reed Warbler	W	W	N
Australian Shelduck	W	W	G
Australian Spotted Crake	W	W	
Australian White Ibis	W	W	
Australian Wood Duck	W	W	
Black Falcon	B	V	N
Black Kite	B	V	N
Black Swan	W	W	G
Black-chinned Honeyeater	B	N	N
Black-faced Cuckooshrike	B	C	N
Black-fronted Dotterel	W	W	G
Black-shouldered Kite	B	V	N
Black-tailed Nativehen	W	W	
Blue-faced Honeyeater	B	N	N
Brown Falcon	B	V	N
Brown Goshawk	B	V	N
Brown Quail	B	SG	G
Brown Songlark	B	SG	G
Brown Thornbill	B	M	N

Common Name	B or Wet	Feeding guild	Nesting guild
Brown Treecreeper	B	B	SH
Brown-headed Honeyeater	B	N	N
Buff-banded Rail	W	W	
Caspian Tern	W	W	
Cattle Egret	W	W	
Chestnut Teal	W	W	
Cockatiel	B	ST	LH
Collared Sparrowhawk	B	V	N
Common Blackbird	x	DG	N
Common Bronzewing	B	SG	N
Common Myna	x	X	N
Common Starling	X	OG	SH
Crested Pigeon	B	SG	N
Crested Shrike-tit	B	B	N
Crimson Rosella	B	ST	LH
crow/raven sp.	B		
Diamond Firetail	B	SG	N
Dollarbird	B	A	LH
Domestic goose sp. (Domestic type)	X	X	
Double-banded Plover	W	W	
Dusky Moorhen	W	W	
Dusky Woodswallow	B	A	L
Eastern Rosella	B	SG	LH
Eastern Spinebill	B	N	N
Eastern Yellow Robin	B	DG	N
Eurasian Coot	W	W	G
Eurasian Skylark	X	X	
European Goldfinch	x	SG	N
Fairy Martin	B	A	L
Fan-tailed Cuckoo	B	M	BP
Flame Robin	B	G	L
Freckled Duck	W	W	
Galah	B	SG	LH
Glossy Ibis	W	W	
Golden Whistler	B	M	N

Common Name	B or Wet	Feeding guild	Nesting guild
Golden-headed Cisticola	B	SG	N
Great Cormorant	W	W	
Great Crested Grebe	W	W	
Great Egret	W	W	
Grey Butcherbird	B	V	N
Grey Fantail	B	C	N
Grey Shrikethrush	B	G	N
Grey Teal	W	W	
Grey-crowned Babbler	B	OT	N
Hardhead	W	W	
Hoary-headed Grebe	W	W	
Hooded Robin	B	OT	N
Horsfield's Bronze-Cuckoo	B	C	BP
House Sparrow	x	X	
Intermediate Egret	W	W	
Jacky Winter	B	OT	N
Latham's Snipe	W	W	
Laughing Kookaburra	B	V	LH
Little Black Cormorant	W	W	N
Little Corella	B	SG	LH
Little Eagle	B	V	N
Little Egret	W	W	
Little Friarbird	B	N	N
Little Grassbird	B	W	N
Little Pied Cormorant	W	W	
Little Raven	B	V	N
Magpie-lark	B	OG	N
Masked Lapwing	W	OG	G
Masked Woodswallow	B	DG	N
Mistletoebird	B	F	N
Musk Duck	W	W	
Nankeen Kestrel	B	V	N
Nankeen Night-Heron	W	W	
Noisy Friarbird	B	N	N
Noisy Miner	B	N	N

Common Name	B or Wet	Feeding guild	Nesting guild
Olive-backed Oriole	B	F	N
Pacific Black Duck	W	W	G
Peaceful Dove	B	SG	N
Peregrine Falcon	B	V	N
Pied Butcherbird	B	V	N
Pied Cormorant	W	W	
Pied Currawong	B	DG	N
Pied Stilt	W	W	
Pink-eared Duck	W	W	
Plumed Whistling-Duck	W	W	
Purple-crowned Lorikeet	B	N	SH
Rainbow Bee-eater	B	A	B
raven sp.	B		
Red Wattlebird	B	N	N
Red-browed Finch	B	SG	N
Red-capped Plover	W	W	
Red-capped Robin	B	DG	N
Red-kneed Dotterel	W	W	
Red-necked Avocet	W	W	
Red-necked Stint	W	W	
Red-rumped Parrot	B	SG	SH
Restless Flycatcher	B	OT	N
Royal Spoonbill	W	W	
Rufous Songlark	B	SG	G
Rufous Whistler	B	C	N
Sacred Kingfisher	B	V	SH
Scarlet Robin	B	OT	N
Sharp-tailed Sandpiper	W	W	
Silver Gull	W	W	
Silvereye	B	F	N
Spotted Harrier	B	V	N
Spotted Pardalote	B	C	B
Straw-necked Ibis	W	W	
Striated Pardalote	B	C	SH
Stubble Quail	B	SG	G

Common Name	B or Wet	Feeding guild	Nesting guild
Sulphur-crested Cockatoo	B	SG	LH
Superb Fairywren	B	OT	N
Swamp Harrier	B	V	G
Tawny Frogmouth	B	V	N
Tree Martin	B	A	SH
Wedge-tailed Eagle	B	V	N
Weebill	B	C	N
Welcome Swallow	B	A	L
Western Gerygone	B	C	N
Whiskered Tern	W	W	
Whistling Kite	B	V	N
White-backed Swallow	B	A	L
White-bellied Cuckooshrike	B	G	N
White-bellied Sea-Eagle	W	W	
White-breasted Woodswallow	B	A	N
White-browed Babbler	B	OT	N
White-browed Woodswallow	B	A	N
White-faced Heron	W	W	N
White-fronted Chat	B	G	N
White-necked Heron	W	W	
White-plumed Honeyeater	B	N	N
White-throated Needletail	B	A	X
White-throated Treecreeper	B	B	SH
White-winged Chough	B	OT	N
White-winged Triller	B	C	N
Willie Wagtail	B	DG	N
Yellow Thornbill	B	C	N
Yellow-billed Spoonbill	W	W	
Yellow-faced Honeyeater	B	N	N
Yellow-rumped Thornbill	B	OG	N
Zebra Finch	B	SG	N

15.4 2014 BLMG Winton report

Report on quarterly bird surveys at Winton Wetlands, by Birdlife Murray Goulburn

May 2013 – May 2014 (prepared by Kathy Costello and published in the BLMG newsletter "the Babbler")

Birdlife Murray Goulburn has now completed 5 quarterly bird surveys at Winton Wetlands, so can provide an initial report on activities and results for the first year. Our next survey is Wednesday 6 August 2014.

1 May 2013 2104 individual birds counted comprising 85 bird species

7 August 2013 3497 individual birds counted comprising 70 bird species

6 Nov 2013 1449 individual birds counted comprising 89 bird species

5 Feb 2014 5027 individual birds counted comprising 82 bird species

7 May 2014 7138 individual birds counted comprising 78 bird species

Our surveys have recorded 119 bird species at the wetlands so far. Numbers and species can vary dramatically from survey to survey. Several reasons for this are:

1. Wetlands are a constantly changing environment. The Winton Wetlands filled in 2011 but were totally dry by March 2014. Pelicans, darters and cormorants require high water levels for fishing, whereas birds that feed on mudflats or in shallow water, such as spoonbills and dotterels, build up in number as the water recedes. The large wetlands at Winton also attract birds as smaller wetlands in the region dry up.
2. Migratory bird species follow a pattern and appear at Winton at predictable times of year. For example, Sacred Kingfishers and Dollarbirds arrive in spring to breed, then head north again in late summer, whereas Flame and Scarlet Robins arrive in autumn and spend winter on the plains, before returning to higher country in the warmer months.

Habitats at Winton Wetlands

We tend to think of wetlands as places for waterbirds. In fact, 60-70% of the bird species we record at Winton are birds of woodlands or grasslands. But when it comes to numbers of individual species, waterbirds move into the wetlands in their hundreds or thousands when conditions are suitable.

The extensive grasslands at Winton are a significant habitat for a number of birds, such as Brown Quail, Rufous and Brown Songlarks, Golden-headed Cisticolas, Diamond Firetails, Zebra Finches, Flame Robins and Australasian Pipits. Some of our raptors or birds of prey are also grassland specialists – and our survey teams have enjoyed great views of Spotted Harriers, Black-shouldered Kites, Brown Falcons and Nankeen Kestrels.

Woodland bird species are also scattered throughout the site, particularly along Lake Mokoan Road and areas around Winton Creek and the Inlet Channel where stands of mature Grey Box eucalypts provide suitable habitat. Brown Treecreeper, Grey Shrike-thrush, White-plumed Honeyeater, Striated Pardalote, Crested Shrike-tit, Red Wattlebird, Black-faced Cuckoo-Shrike and White-browed Babbler are some of the species we have recorded in these areas.

Survey methods

Bird surveys are conducted every 3 months at 11 sites, chosen as representative of the different ecosystems at the site. Our first survey started with two teams, and took four and a half hours. It made for a very late lunch. In recent surveys we have improved our logistics using four teams to survey three to four sites each. Our surveys now take about 3 hours and we try to finish by 12 noon, in time to enjoy lunch together at the yacht club. As well as recording bird species and numbers at each survey site, we also record incidental sightings while we travel between survey sites. Permanent water is at 2 sites – Duck Pond and at the Borrow Pits, and these have been the sites where most species are recorded.

Highlights

May 2013 Eighteen Freckled Duck on the borrow pits near the old dam wall. This is Australia's rarest duck, and it is a protected species.

November 2013 600 Pelicans were counted, most near The Spit. Pelicans have been recorded in four of our five surveys. The wetlands dried in March 2014 and although some water had returned by May 2014, the fish had not, and no pelicans were present.

February 2014240 Yellow-billed Spoonbills feeding in the muddy shallows along the shoreline between the yacht club and the boat ramp

May 2014 4625 Grey Teal feeding in shallow water neat The Spit with a few at Duck Pond and on the borrow pits

Another highlight has been the thirteen species of raptors we have recorded. The wide open spaces of Winton Wetlands are ideal for observing these birds. The most numerous have been Whistling Kite and Brown Falcon, while other regular sightings include Wedge-tailed Eagle, Black-shouldered Kite, Peregrine Falcon, Swamp Harrier and Spotted Harrier.

Kathy Costello

June 2014

WINTON WETLANDS SURVEYS—SOME REFLECTIONS Published in the Babbler April 2017

BirdLife Murray Goulburn has completed 195 quarterly surveys around Winton Wetlands in the four years from 2013. As at February 2017, we have seen a total of 152 species of birds. In the first year, 2013, we saw 115 species; in 2014, 21 more new species; in 2015 five new species added and in 2016, 4 new species added. This progression is the classic curve of diminishing returns. That is, there are only a certain number of species to be seen at the Wetland and increasing effort is required over time to add new species to our tally.

How does our total at Winton Wetlands compare to the total as listed in the eBird Hotspot report for Winton Wetlands? The comparison is rough and ready because we have broken our listing into around a dozen sub-sites at the Wetlands. In any case, as at the end of 2016, 189 species had been seen at Winton Wetlands, according to eBird. So, we have missed a few species! Notable birds we have not yet seen include the following:

Emu (latest sighting Oct 2015)
Brolga (latest sighting Nov 2012)
Swift Parrot (latest sighting Apr 2011)
Fuscous Honeyeater (latest sighting Apr 2017)
Grey-crowned Babbler (latest sighting Mar 2011)
Sittella (latest sighting Mar 2011)

Interestingly, although several of us have seen Musk and Purple-crowned Lorikeets at the Wetlands, we have yet to report them during our surveys. The surveys are a snapshot of the birds there at a specific time. Hence there is an element of luck involved in what species we report.

In 2016 we counted a total of 8,925 individual birds at the Wetlands. That may seem a large number, but our highest annual total was in 2014 with a whopping 32,500 individual birds counted! The following species have a grand total of more than 500 individuals seen this year:

Sulphur-crested Cockatoo-2658
Straw-necked Ibis-577
Grey Teal-555
Little Corella-505

However, 2016 was not notable for waterbirds. In our bumper year of 2014 we counted over 20,000 Grey Teal. The month with the highest total of species was November 2013, with 89 species reported.

As the abundant water at the Wetland starts to dry up and the aquatic food increases and becomes more concentrated, hopefully the bumper bird numbers will return. And, we have all those ‘missing’ species to keep looking for.

16 Site information

The images have been extracted from Zoom Earth (https://zoom.earth/).

They are not to scale.

16.1 Duckpond

A wetland site, with surrounding bushland.

16.2 Dam Wall

A series of borrow pits used to provide fill for the dam wall construction, can hold water for long periods. The hydrology of the borrow pits ranges from wet (close to the outlet channel/Stockyard Creek) to dry at the southern end of the wall.

16.3 The Spit

The Spit is the northern tip of the large lunette separating Winton Swamp from Green Swamp. The site provides good views into the adjacent wetlands.

16.4 Visitor Area Boat Ramp and Woodland

This site is a mixture of bushland and wetland.

16.5 North Shore Woodland

This site is a mixture of bushland and wetland.

16.6 Greens Hill

Greens Hill is a bushland site. It is surrounded by wetland, but has never been inundated.

16.7 Humphries Hill

Humphries Hill is a bushland site with nearby wetland that is included in surveys. The Hill has never been inundated.

16.8 Eleven Mile Creek woodland

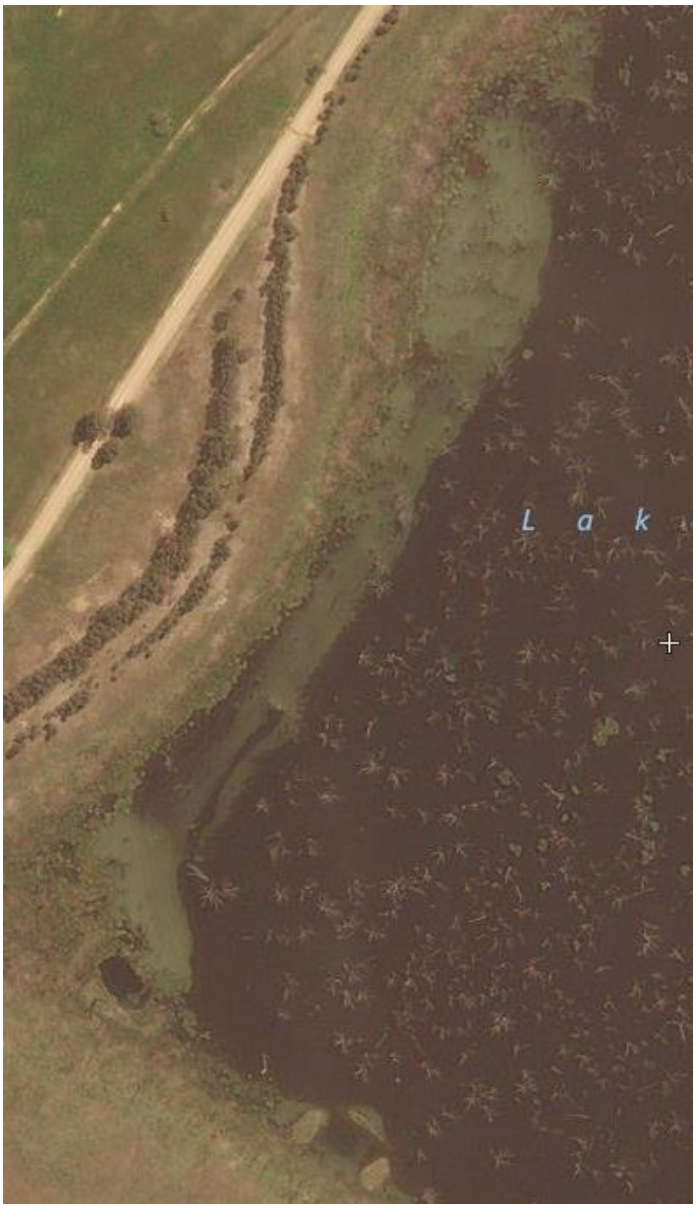
This is a wetland site, but it is rarely inundated, and therefore represents a much drier wetland environment.

16.9 Ashmeads Swamp

A wetland site; not often inundated.

16.10 Bill Friday Swamp

A wetland site with a thin fringe of bushland.



16.11 Boggy Creek Bridge

A wetland site

17 Waterbird Functional Grouping

Australasian Darter	FE
Australasian Grebe	FE
Australasian Shoveler	DA
Australasian Swamphen	SH
Australian Hobby	R
Australian Pelican	FE
Australian Shelduck	G
Australian Spotted Crake	SH
Australian White Ibis	LW
Australian Wood Duck	G
Black Falcon	R
Black Kite	R
Black Swan	DW
Black-fronted Dotterel	SM
Black-shouldered Kite	R
Black-tailed Nativehen	SH
Brown Falcon	R
Brown Goshawk	R
Buff-banded Rail	SH
Caspian Tern	FE
Cattle Egret	FE
Chestnut Teal	DA
Collared Sparrowhawk	R
Double-banded Plover	SM
Dusky Moorhen	SH
Eurasian Coot	DW
Freckled Duck	DA
Glossy Ibis	LW
Great Cormorant	FE
Great Crested Grebe	FE
Great Egret	FE
Grey Teal	DA
Hardhead	DW
Hoary-headed Grebe	FE
Intermediate Egret	FE
Latham's Snipe	SH
Little Black Cormorant	FE
Little Eagle	R
Little Egret	FE
Little Pied Cormorant	FE
Masked Lapwing	SH
Musk Duck	DW

AFTER Rogers et al

FE	fish eater
DW	Deep water forager
DA	Dabbling ducks
G	GRAZING WATERFOWL
SH	Shoreline foragers
LW	LARGE WADER
SM	SMALL WAFER
SM	SMALL WAFER
LW	LARGE WADER
SM	SMALL WAFER
SM	SMALL WAFER
SM	SMALL WAFER

Nankeen Kestrel	R
Nankeen Night-Heron	FE
Pacific Black Duck	DA
Peregrine Falcon	R
Pied Cormorant	FE
Pied Stilt	SM
Pink-eared Duck	DA
Plumed Whistling-Duck	G
Red-capped Plover	SM
Red-kneed Dotterel	SM
Red-necked Avocet	SM
Red-necked Stint	SM
Royal Spoonbill	LW
Sharp-tailed Sandpiper	SM
Silver Gull	FE
Spotted Harrier	R
Straw-necked Ibis	LW
Swamp Harrier	R
Wedge-tailed Eagle	R
Whiskered Tern	FE
Whistling Kite	R
White-bellied Sea-Eagle	R
White-faced Heron	FE
White-necked Heron	FE
Yellow-billed Spoonbill	LW