

2015 - 16

WATERBIRD MONITORING WITHIN BARMAH-MILLEWA FOREST



2015-2016 Waterbird Condition Monitoring Report

Report Title: Water Bird Monitoring within Barmah-Millewa Forest: Spring 2015

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Report prepared for: Office of Environment & Heritage as part of the Barmah-Millewa Forest Icon Site Condition Monitoring Program.

Front cover photo: Little pied cormorant chicks, St Helena (Photo NPWS, spring 2015).

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Acknowledgements.

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

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SUMMARY

The surveys for waterbirds in Barmah-Millewa Forest for 2015-16 recorded a total of 41 species and more than 1600 individual waterbirds. The majority of the birds were recorded on Duck Lagoon, Moira Lake and Reed Beds South in New South Wales (NSW), and in Victoria (Vic), Steamer Plain. The wetlands in NSW recorded the majority of the waterbirds. The majority of the sentinel wetlands monitored as part of 'The Living Murray' (TLM) wetland condition monitoring received water over the spring/summer period, which supported a small breeding event in the major wetlands (Reed Beds wetland complex (NSW), Boals Deadwoods (Vic)).

Three threatened (DSE 2013, *Threatened Species Act* [TSC] 1995) waterbird species were recorded from the sentinel wetlands within Barmah-Millewa: Australasian bittern *Botaurus poiciloptilus* (present in Boals Deadwoods, Top Island, Pig Hole and Steamer Plain (Vic), Reed Beds North (NSW)) Australian little bittern *Ixobrychus dubius* (Boals Deadwoods and Steamer Plain) and eastern great egret *Ardea modesta* (Barmah Lake).

The total number of breeding pairs of colonial nesting waterbirds recorded from the sentinel wetland monitoring sites for 2015/16 within Millewa was approximately 1105 pairs and within Barmah, 370 pairs. The following species were recorded breeding: Australasian darter *Anhinga novaehollandiae*, little pied cormorant *Microcarbo melanoleucos*, eastern great egret, Australian white ibis *Threskiornis molucca*, straw-necked ibis *Threskiornis spinicollis* and royal spoonbill *Platalea regia*.

INTRODUCTION

The current surveys are being undertaken as part of the ongoing condition monitoring program within Barmah-Millewa Forest – a Living Murray icon site. A baseline monitoring survey of waterbirds was undertaken between 1999 and 2003 (Webster 2004a, b). Follow-up seasonal surveys were conducted during 2008, 2010, 2011/12 and 2012/13 (Webster 2008a, b, c, d, 2010a, b, c, d, OEH 2012a, b, c. 2013).

The aim of the surveys is to monitor waterbird assemblages to provide information on species richness and relative abundance over time and with varying environmental conditions (water availability).

This report presents an overview of the 2015-16 waterbird monitoring results and discussion on long term trends of waterbird diversity and abundance within the Barmah-Millewa Forest icon site. Environmental water was delivered from a number of organisations during the spring/summer period this year, including the Commonwealth Environmental Holder (CEWH), TLM, the Office of Environment and Heritage (NSW) and the Victorian Environmental Water Holder (VEWH) (Table 1).

Source	Approved Volume (ML)	Delivered Volume (ML)
Commonwealth environmental water holder	500,000 ML (including 8,000 ML for bird breeding in Reed Beds wetland complex)	366,794 (48,000 to Barmah-Millewa))
The Living Murray (TLM)	75,300 ML (including 15,300 ML bird breeding contingency)	52,000
New South Wales Office of Environment and Heritage (OEH) and Victorian Environmental Water Holder (VEWH)	Allocations for bird breeding at Reed Beds wetland complex and Boals Deadwoods (6,000)	

Table 1: Organisations that contributed water to Barmah-Millewa Forest in 2015-16.

METHODS

STUDY SITES

Prior to the initial study in 1999, waterbird monitoring site locations were determined in consultation with staff from Forestry Corporation of NSW and the Victorian Department of Environment, Land, Water and Planning (DELWP). Twelve wetland sites (Figure 1) within Barmah–Millewa Forest were identified as monitoring sites (Table 1). These sites were chosen as they cover a range of habitat types, have been included in previous monitoring programs (Webster 2004b, unpublished data) and are accessible during both dry periods and floods.

An additional site was added to the survey sites this year, at Top Island in Barmah. Top Island was chosen to eventually replace the site Boals Deadwoods. Large scale encroachment of Giant Rush *Juncus ingens* in Boals Deadwood has caused the conversion of previously open wetland to dense rushes. This has altered the original landscape surveyed, reducing its relevance as a survey site in this study. Top Island was chosen as a replacement site as it currently possesses similar characteristics to that of the original site at Boals Deadwood. Both sites will be surveyed until it is suitable for Boals Deadwoods to be removed from the study.

Barmah National Park	Murray Valley National Park (precinct)
Pig Hole (east & west)	Horseshoe Lagoon (Gulpa Is)
Steamer Plain	Reed Beds North (Moir)
Barmah Lake	Reed Beds South (Moir)
Boals Deadwoods	Duck Lagoon (Moir)
Goose Swamp	Moir Lake (Moir)
Bunyip Hole	St. Helena Swamp (Millewa)
Top Island	

Table 2: Waterbird monitoring sites

SURVEY METHODOLOGY

A survey transect or point was established on each wetland. Transects were located in order to survey as much of the wetland as was accessible. In the event that the wetland was flooded or colonial waterbird breeding was occurring, a single traverse of each transect starting and finishing at the survey point was completed. If the wetland was dry or only partially flooded, then the assessment of the wetland was undertaken from the survey point. The group of birds known as waterbirds contains a large number of species. For the purposes of this study, species from the following families were considered waterbirds:

- Anatidae (Swans, Geese, Ducks);
- Podicipedidae (Grebes);
- Anhingidae (Darters);
- Phalacrocoracidae (Cormorants);
- Pelecanidae (Pelicans);
- Ardeidae (Hérons, Egrets, Night Herons, Bitterns);
- Threskiornithidae (Ibises Spoonbills);
- Accipitridae (Hawks, Harriers);
- Gruidae (Cranes);
- Rallidae (Crakes, Rails, Gallinules);
- Scolopacidae (Snipe, Godwits, Curlews, Sandpipers, Stints, Phalaropes);
- Recurvirostridae (Stilts, Avocets);
- Charadriidae (Plovers, Dotterels, Lapwings);
- Laridae (Gulls, Terns)
- Halcyonidae (Sacred Kingfisher *Todiramphus sanctus*)
- Alcedinidae (Azure Kingfisher *Alcedo azurea*); and
- Silyviidae (Old World Warblers).

All waterbird species observed on the wetland or flying over were recorded. In the event of breeding the number of nests, eggs and chicks were also recorded where possible.

TLM Waterbird Condition Monitoring Sites

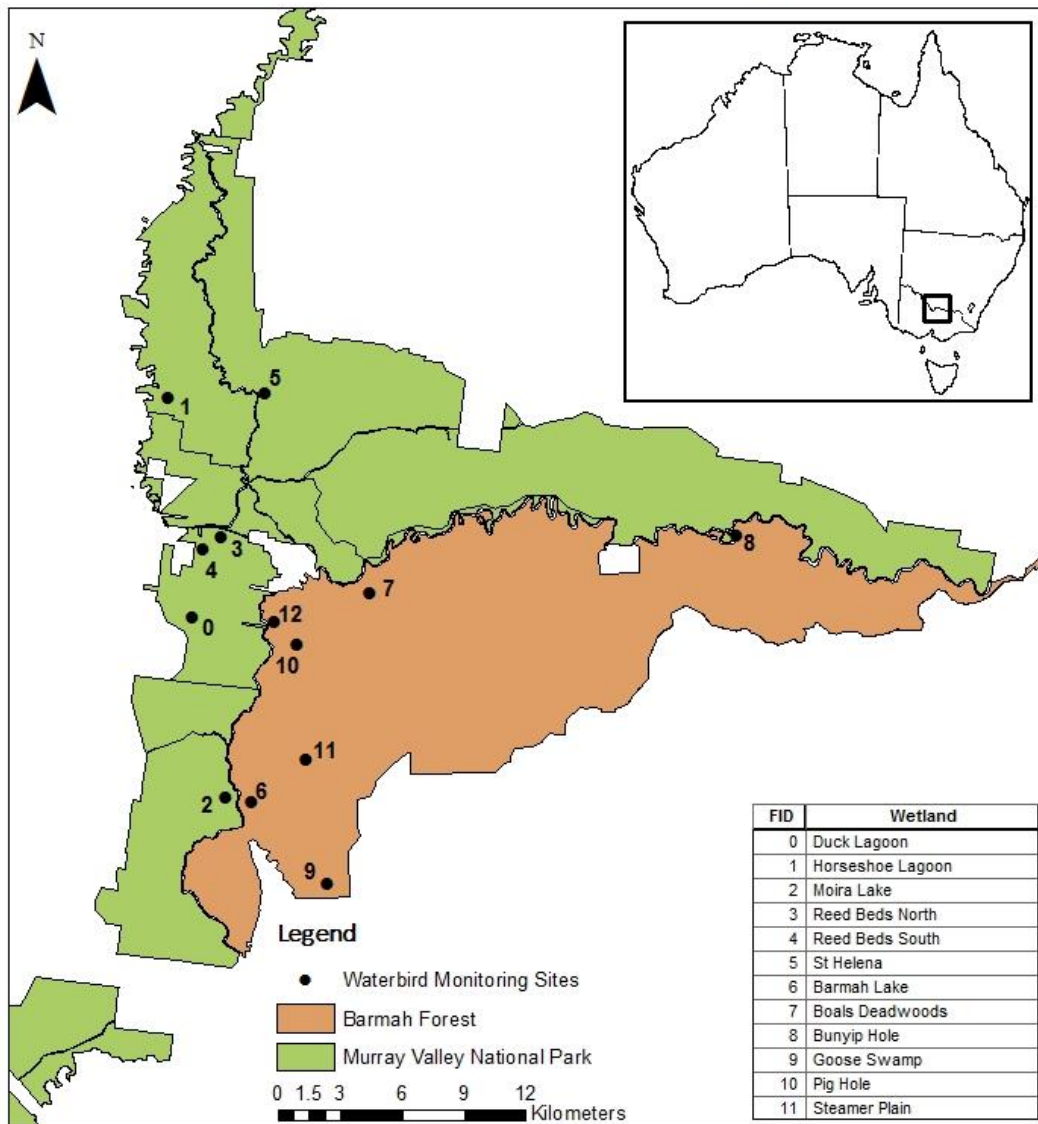


Figure 1: Waterbird Survey locations Within Barmah-Millewa Forest

RESULTS

SPRING 2015

The spring 2015 surveys for waterbirds were conducted between the 8th of October and the 2nd of November. The average temperature in the survey period was 23 degrees Celsius. A total of 33 species (Figure 3) and 1 629 individuals (Figures 4 and 5) were recorded at the survey sites (Appendix 1). The majority (81%) of the waterbirds were found in Millewa with significant numbers of waterbirds across the larger, open water wetlands which had received small natural floods (late July to early September) and environmental water (September-December). The sites supporting the majority of the waterbirds were: Duck Lagoon (414), Moira Lake (199), Reed Beds (553) and St Helena (170) (Figures 4 & 5). Breeding of colonial nesting species was recorded in Reed Beds, St Helena and Boals Deadwood. Breeding extent and the species involved was further investigated as part of the intervention monitoring program and will be reported upon separately.

The trends in waterbird numbers for all sentinel wetland sites and the individual wetlands within each state are shown in **Figure 2** and **Figure 3**.

Three threatened wetland dependent species recorded from the Barmah-Millewa forest during the survey period. They were:

- Australasian bittern *Botaurus poiciloptilus*, single birds recorded at Boals Deadwoods, Pig Hole (east and west) and Steamer Plain, two birds were recorded at Top Island, (endangered Federal *Environment Protection Biodiversity (EPBC) Act 1999*, DSE 2013);
- Australian little bittern *Ixobrychus dubius*, single birds were recorded at Boals Deadwoods and Steamer Plain (endangered DSE 2013); and
- Eastern great egret *Ardea modesta*, five birds in breeding plumage were recorded at Barmah Lake (vulnerable DSE 2013). The eastern great egret is listed on migratory bird agreements between the Federal Government and the national governments of China and Japan.

No threatened species were recorded on the sentinel wetlands within the Millewa portion of the icon site during the current round of condition monitoring.

SUMMER 2015/16

The summer surveys were carried out between the 19th and 27th of January. The average temperature in the survey period was 27 degrees Celsius. A total of 30 species were identified and >1550 individuals recorded. The majority of the individuals were recorded in NSW (88%). The surveys within Millewa recorded 30 different species and Barmah, 23. The major wetlands that were inundated in spring remained the major sites for waterbird presence. These included the Reed Beds complex, Duck Lagoon and Moira Lake. Horseshoe lagoon also recorded a significant variety of species (12). In Barmah, Barmah Lake and Steamer Plain shared the highest diversity of species (15) and were the two most significant wetlands supporting a small number of individuals (Figure 2). There was a significant drop in species in St Helena between spring and summer, due to the drop in water levels. Additional water was provided to Reed Beds complex and Boals Deadwood to support the colonial waterbird breeding event that continued into January.

Three vulnerable species were identified in the summer surveys:

- Australasian bittern *Botaurus poiciloptilus*, a single bird was heard calling in Reed Beds north (endangered Federal *Environment Protection Biodiversity (EPBC) Act 1999*, TSC Act 1995, DSE 2013);
- Eastern great egret *Ardea modesta*, Steamer Plain (DSE 2013);
- Musk duck *Biziura lobata*, Barmah Lake (DSE, 2013).

AUTUMN 2016

Autumn surveys were conducted between the 15th of April and the 16th May. The average temperature during the surveys was 23 degrees Celsius. A total of 31 species were identified and 1758 individuals were recorded. Numbers of waterbirds in autumn was split evenly across Barmah-Millewa with 51% recorded in Barmah and 49% in Millewa. One hundred percent of the individuals recorded in Barmah were recorded on Barmah Lake as the remaining sites were either dry or had very low water levels. Millewa recorded 27 species and Barmah, 23. The major wetlands supporting the majority of waterbirds were Barmah Lake and Moira Lake. The reduction in water levels in these two lakes during autumn attracts a large number of waterbirds to the shallow water and exposed mud flats for foraging at both sites. This was seen on Barmah Lake with an increase of over 1000% of individuals present with an approximate 70% drop in water level in the lake (Figure 2).

One vulnerable water dependent birds were identified in the autumn surveys:

- Eastern great egret *Ardea modesta*, 7 birds were recorded at Barmah Lake (DSE 2013);

WINTER 2016

The winter surveys were conducted between the 13th and 23rd of June. The average temperature during the surveys was 9.8 degrees Celsius. A total of 21 species were identified and 920 individuals were recorded. Due to wet weather and overbank flows, all sites were not able to be surveyed as access was limited. Sites that were not surveyed were Boals Deadwood, Top Island, Pighole East and West, and Gooseswamp. The majority of the waterbirds recorded were found on Barmah Lake, and to a lesser degree, Duck Lagoon. No threatened (TSC Act 1995, DSE 2013) species were identified during the winter surveys.

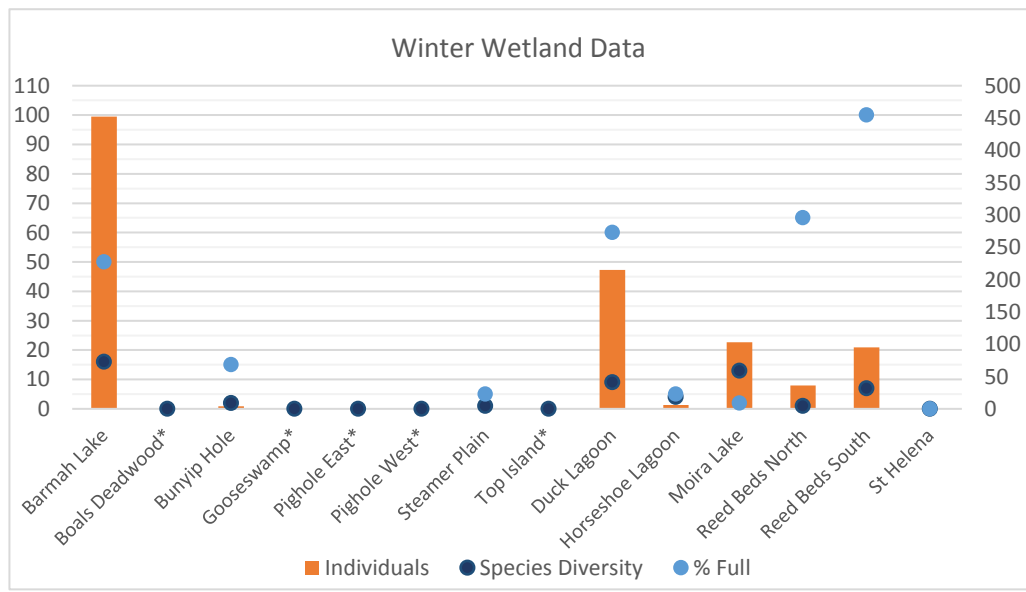
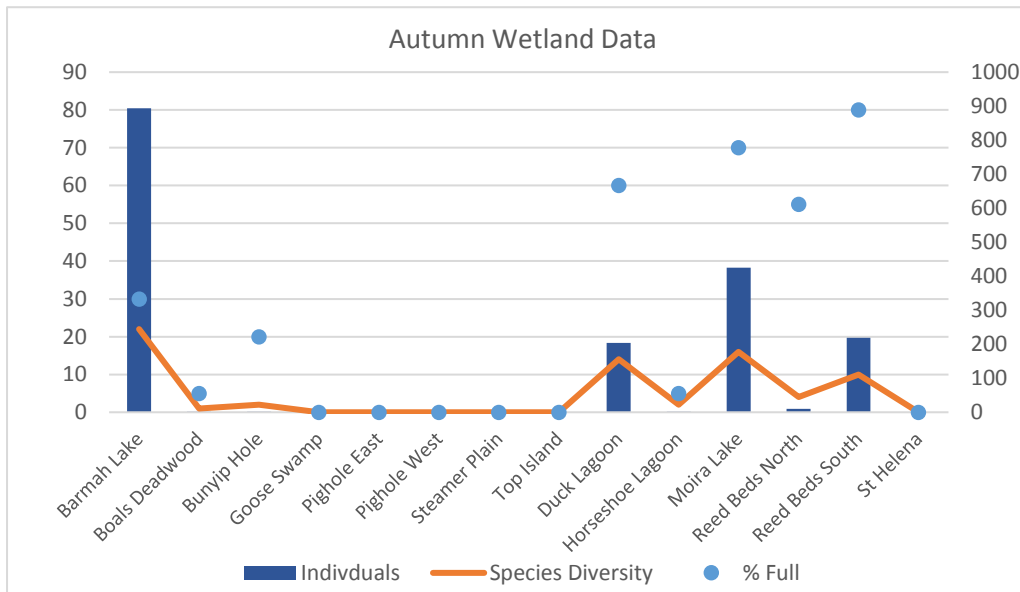
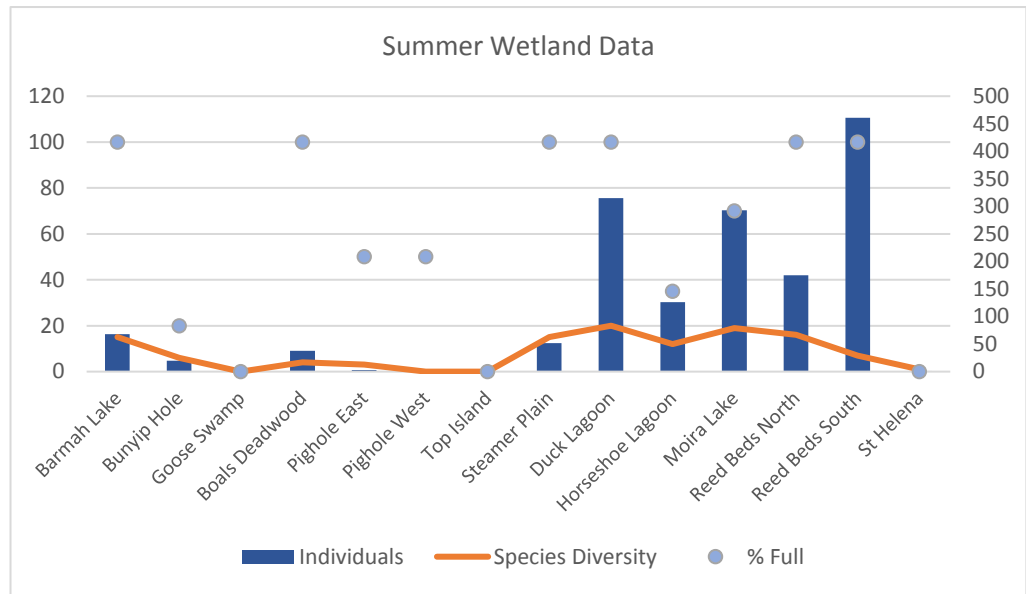
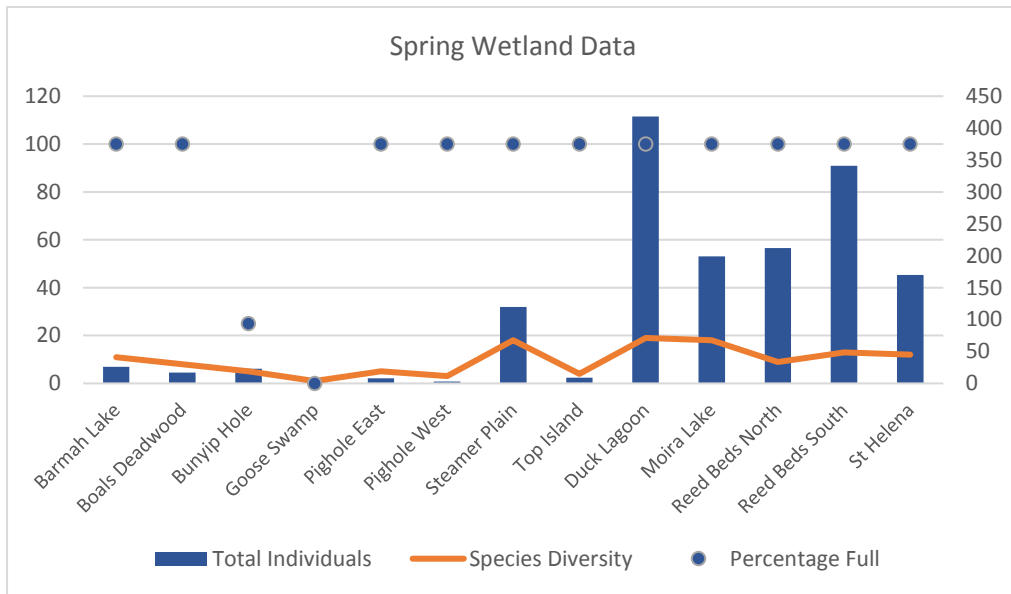


Figure 2: The 14 sentinel wetlands monitored across Barmah-Millewa. For each of the season’s water level, number of individuals and species diversity recorded is shown. It can be seen that the drop in water levels in autumn corresponded with a large increase in waterbirds on Barmah Lake, whilst there was a significant decrease in waterbirds recorded on Reed beds, Duck Lagoon and Moira Lake, however species diversity did not experience the same decrease. *Sites were not surveyed.

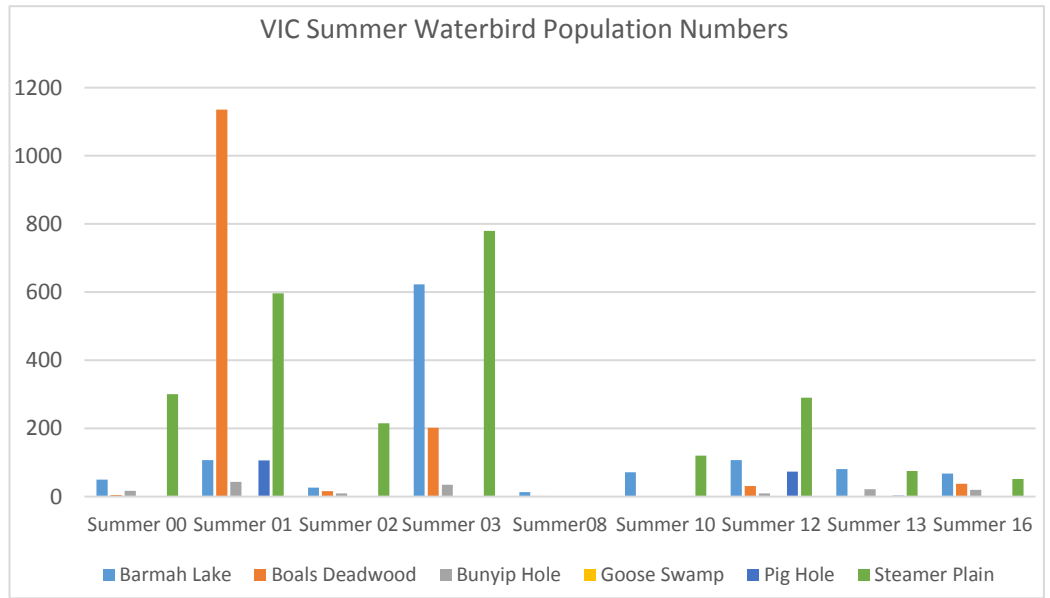
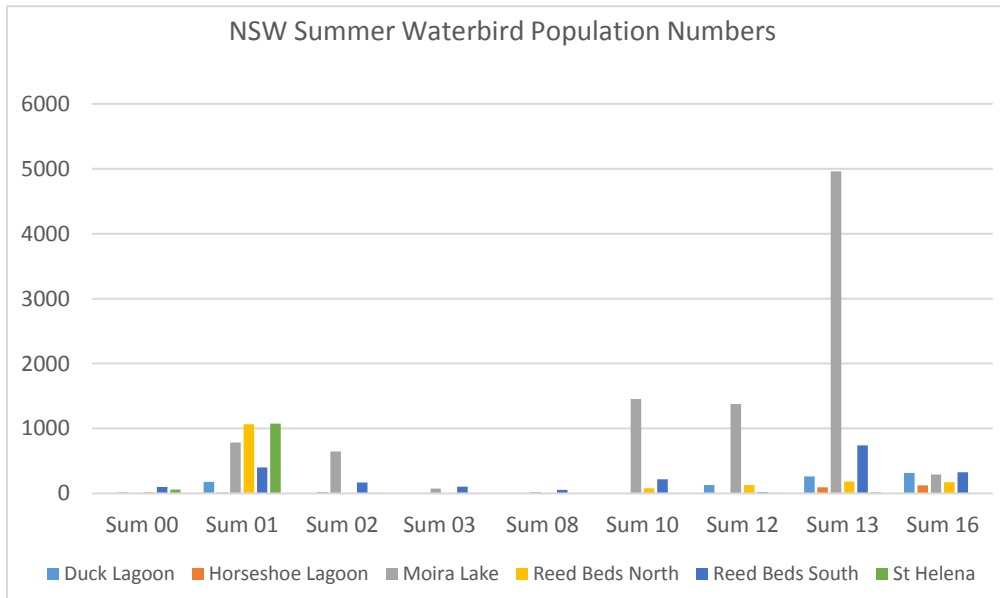
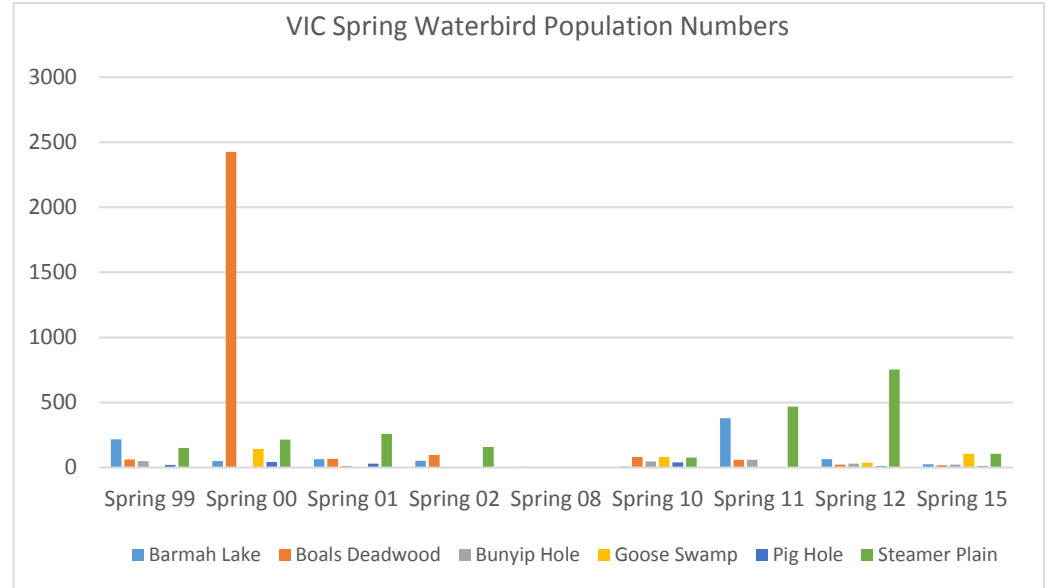
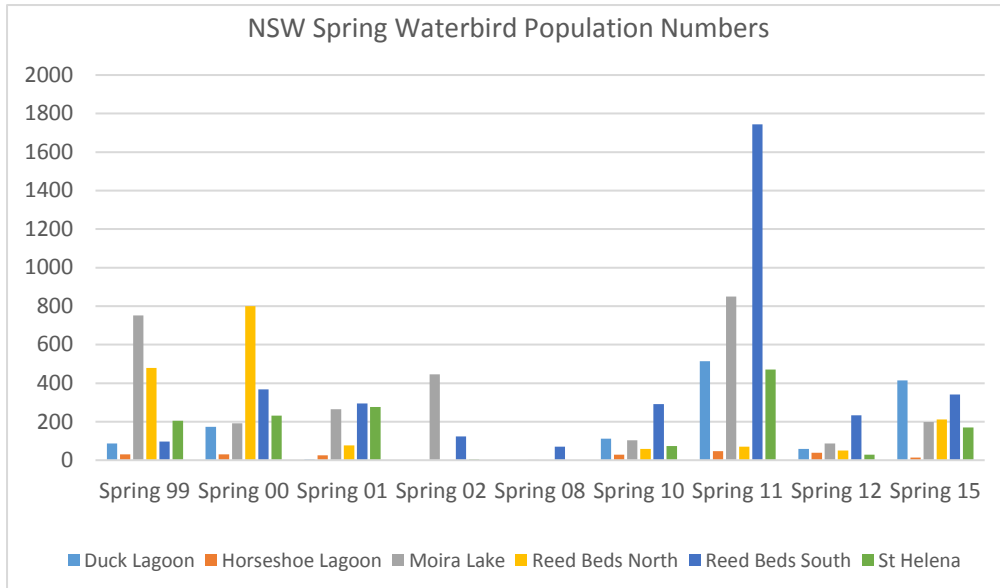


Figure 3: A comparison between sites in NSW and Victoria of population numbers over the spring and summer periods for the 8 years of monitoring. It can be seen that numbers are spread across a greater number of wetlands in spring, and numbers become more concentrated in summer as water levels in wetlands decline. Increases in individuals during summer can be seen in significant flood years (2012-13) with summer recording a higher number of waterbirds than spring. These spring/summer periods don't capture the complete wetland drying phase and the increase in bird numbers on wetlands offering shallow water and extensive mud flats (e.g. Barmah Lake).

DISCUSSION

Since surveys began in 1999, the icon site has had a mean spring species diversity of 32 species [range 24-35] excluding the 2008 survey [10 species] (Figure 3). The difference in species diversity between spring 2008 and all other spring monitoring periods is probably due to 83% (10) of the sentinel wetland monitoring sites being completely dry during the spring 2008 monitoring period while in the other years surveyed, all sites or the majority of sites were full or flooded. When spring 2008 is included then the average number of species recorded during spring monitoring is reduced to 28.5 species. A complete list of waterbird species recorded during the waterbird surveys within Barmah-Millewa Forest since spring 1999 is included in Appendix 2. Since data collection began, 71 species have been identified utilising the sentinel wetlands included in the condition monitoring program. Chesterfield *et al.* (1984) surveyed Barmah National Park during the period 1977-1980 and recorded 57 species of waterbird. This included four species (cattle egret *Ardea ibis*, spotless crane *Porzana tabuensis*, sharp-tailed sandpiper and red-capped plover *Charadrius ruficapillus*) only recorded from the wetlands within Murray Valley National Park since the current monitoring program began. Chesterfield *et al.* (1984) also noted that an additional five species had been recorded historically within Barmah National Park.

These species were:

- Magpie goose *Anseranas semipalmata* – recorded breeding during the 1800's but not recorded in the icon site during either the 1977-1980 (Chesterfield *et al.* 1984) or current icon survey period (1999-2015).
- Brolga *Grus rubicunda* - recorded once during the icon site condition monitoring indicating that the species still occasionally uses the icon site.
- Buff-banded rail *Gallirallus philippensis* – recorded once during the icon site condition monitoring supporting Chesterfield *et al.*'s (1984) comment that the species is occasionally reported.
- Ballion's crane *Porzana pusilla* – not recorded during the icon site surveys.
- Australian Painted Snipe *Rostratula australis* - not recorded during the icon site surveys.

Although the current study has been conducted over the whole icon site and over a longer time frame than Chesterfield *et al.* (1984) the differences in methodology probably account for the differences in species diversity between the two studies. Species diversity (66) recorded by Forestry Commission (FC) of NSW (1985) was similar to that recorded since 1999 although the FC of NSW data came from a much larger study area.

The wetlands in Barmah-Millewa Forest provide a wide range of habitats including deep open water suitable for diving species (e.g. Cormorant spp.) and shallow water for wading species (e.g. Spoonbills). Due to this, a range of species utilise the icon site. Waterbird species diversity across the icon site fluctuates between seasons and years (Figure 4).

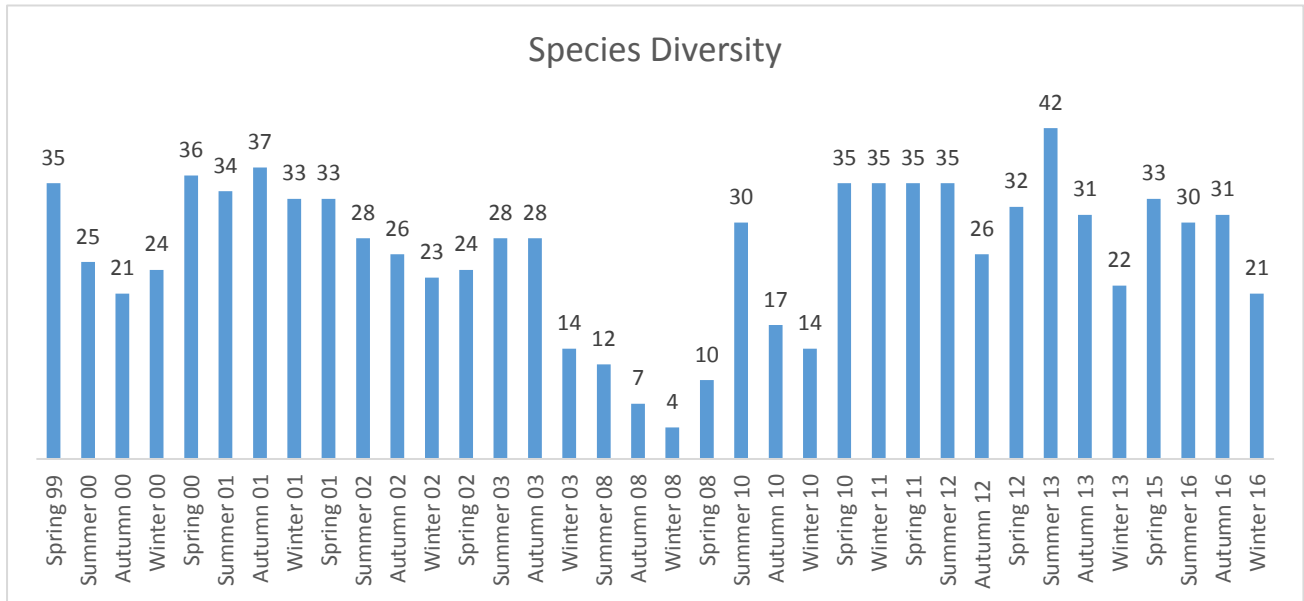


Figure 4: Species diversity recorded in Barmah-Millewa Forest from 1999 to 2016.

The lowest diversity recorded since monitoring began was seen in 2008, when most wetlands were not inundated and water was limited due to drought conditions. Since 2010 (post- drought), species diversity has been similar too pre-2003 levels. 2010/2011 saw a particularly positive year, with high species diversity in all seasons due to extensive inundation across Barmah-Millewa Forest. Winter generally presents lower species diversity as wetlands dry out with low river levels and the wetland conditions only favours certain species (e.g. Masked Lapwing *Vanellus miles*, Black Swan *Cygnus atratus*, Australian Shelduck *Tadorna tadornoides*). In winter 2016, water levels within most wetlands in Barmah-Millewa Forest dropped to low levels briefly, before some early inundation as a result of high flows into the Murray River from the unregulated streams (Kiewa and Ovens Rivers).

Among the range of waterbird species that utilise the wetlands across Barmah Millewa Forest are species that have been listed as threatened and/or declining (**Table 3**). Among these species is the Australasian bittern, which has been identified in the icon site since surveys began in 1999 and is listed as endangered under the Federal *EPBC Act* 1999.

Wetlands within the Barmah-Millewa forest also provides habitat for migratory waders during their non-breeding period visits to Australia. Migratory species previously recorded include: Double-banded Plover *Charadrius bicinctus*, Marsh Sandpiper *Tringa stagnatilis* and Sharp-tailed Sandpiper *Calidris acuminata*. No migratory waders were recorded during the current year of monitoring.

SPECIES	STATUS
Australasian Bittern	Endangered (<i>EPBC Act 1999</i>); Listed (<i>Flora and Fauna Guarantee Act 1988</i>); Endangered (Victoria: DSE 2013, NSW: <i>TSC Act 1995</i>)
Australian Little Bittern	Listed (<i>Flora and Fauna Guarantee Act 1988</i>); Endangered (Victoria DSE 2013)
Eastern Great Egret	Listed (<i>Flora and Fauna Guarantee Act 1988</i>); Vulnerable (Victoria DSE 2013)
Azure Kingfisher	Near Threatened (Victoria DSE 2013)
Musk Duck	Vulnerable (Victoria DSE 2013)

Table 3: Threatened species recorded in the icon site in 2015-2016.

Since monitoring began, the total waterbird numbers observed on the wetland monitoring sites within the icon site during spring has ranged from 81 (2008) to 4 674 (2000) (Figure 5). The abundance and richness of species present within the wetlands across and between years (Figure 3 & Figure 5) may be influenced by a range of factors. It is thought that a drying phase during the preceding late summer/autumn followed by large flood events in late winter/spring may contribute to large numbers of individuals utilising the wetlands in spring due to increased productivity. Major wetlands that often undergo drying phases in Barmah-Millewa include Moira Lake, Steamer Plain and Duck Lagoon. Unseasonal flows during late summer/early autumn (as a result of the delivery of consumptive water and/or rain rejection flows) can cause increased low-levels of inundation during this period. This may influence the potential for the wetlands to dry out completely. Complete drying can aid in controlling the spread of aquatic weeds, reduction/removal of carp and allow natural processes to occur which help native vegetation regeneration/control and allow for productivity increases when the wetlands re-fill in the following spring.

Drying of the wetland during the preceding late summer/autumn period allows aquatic organisms to complete their life cycles. This also gives biotic material an opportunity to break down during the drying phase, releasing nutrients into the wetland bed. Additionally, the size of flood events and the extent of floodplain inundation can also determine species assemblages within the wetlands. The size and extent of inundation of floodwaters received during winter can also determine which species will be present in the wetlands. Figure 5 displays species abundance in relation to the average seasonal flow released from Yarrawonga Weir. In spring, a watering event provided flows above channel capacity, allowing water to be delivered to a number of wetlands in the forest. Since 2010, high flows have seemingly correlated with a rise in the number of species found utilising the

wetlands. This diversity appears to have been maintained, even with lower than average flows received within the forest over the last two years.

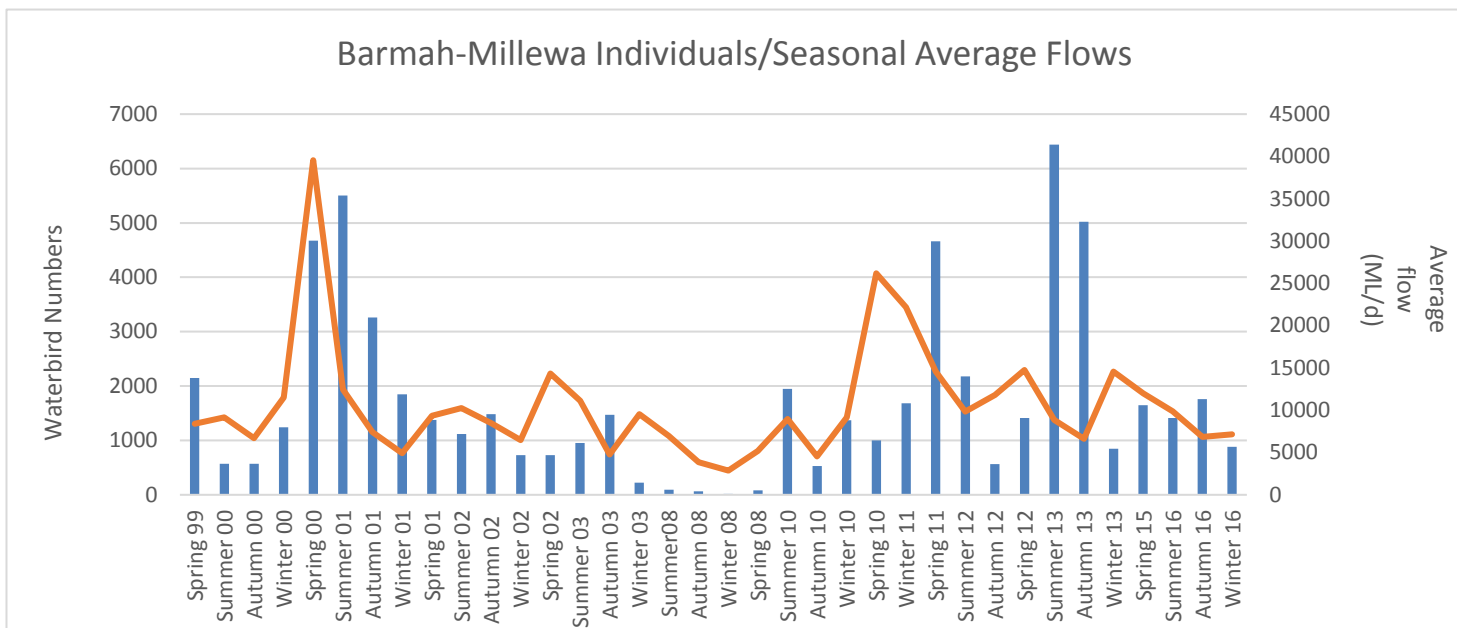


Figure 5: Total number of waterbirds recorded on sentinel wetlands within the Barmah-Millewa Forest and average seasonal flows below Yarrawonga weir.

The health of the wetlands which support the waterbird populations of Barmah-Millewa Forest appear to have recovered well after the millennium drought. In Victoria however, the extent of waterbird abundance in wetlands appears to not have occurred in the same capacity since the early 2000's. This could be due to changing habitat in wetlands (such as Boal's Deadwood) making it less suitable for certain waterbirds, or reducing the effectiveness of survey methods due to dense vegetation. More research on waterbirds and their requirements could further inform management actions and managing their environment. The Environmental Water Knowledge and Research (EWKR) project is currently conducting further investigation into waterbird populations in the Barmah-Millewa Forest wetlands. This project commenced in spring 2015 and may be able to provide information on our waterbird, fledging rates, dispersal strategies, and dispersal locations.

More rigorous analysis of the waterbird data should be conducted to review the status of our waterbirds and changes over time. The current surveying methodology has been adequate, however a review could find improvements that could be used to increase our knowledge and understanding of population trends and waterbird requirements.

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APPENDICES

APPENDIX 1: COMPLETE WATERBIRD LIST

Bird species list for Barmah-Millewa Forest based on all species identified within Barmah-Millewa Forest during the completion of condition monitoring surveys since spring 1999.

Survey Date		Spring 99	Summer 00	Autumn 00	Winter 00	Spring 00	Summer 01	Autumn 01	Winter 01	Spring 01	Summer 02	Autumn 02	Winter 02	Spring 02	Summer 03	Autumn 03	Winter 03	Summer 08	Autumn 08	Winter 08	Spring 08	Summer 10	Autumn 10	Winter 10	Spring 10	Winter 11	Spring 11	Summer 12	Autumn 12	Spring 12	Summer 13	Autumn 13	Winter 13	Spring 15	Summer 16	Autumn 16	Winter 16		
Common Name	Scientific name																																						
Australian Little Bittern	<i>Ixobrychus minutus</i>																					X																X	
Australian Pelican	<i>Pelecanus conspicillatus</i>	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Australian Shelduck	<i>Tadorna tadornoides</i>	X		X	X			X	X	X	X	X	X			X	X		X					X	X					X	X	X					X	X	
Australian Shoveler	<i>Anas rhynchos</i>	X			X	X		X	X	X		X				X									X	X					X							X	
Australian Spotted Crake	<i>Porzana fluminea</i>																												X		X						X		
Australian Reed-warbler	<i>Acrocephalus australis</i>	X	X	X		X	X	X	X	X	X			X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X			X	X	X		
Australian White Ibis	<i>Threskiornis molucca</i>	X	X	X	X	X	X	X	X	X	X	X		X	X	X		X			X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Australian Wood Duck	<i>Chenonetta jubata</i>	X	X	X	X	X	X	X	X	X	X	X	X	X	X											X	X	X	X	X	X	X	X	X		X	X	X	
Australasian Bittern	<i>Botaurus poiciloptilus</i>					X	X							X	X							X			X	X									X	X			
Australasian Darter	<i>Anhinga novaehollandiae</i>	X	X		X	X	X	X	X													X			X	X	X	X	X	X	X	X	X		X	X	X		
Australasian Grebe	<i>Tachybaptus novaehollandiae</i>					X	X	X	X						X	X									X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Azure Kingfisher	<i>Ceyx azureus</i>							X																				X	X	X	X	X	X	X	X		X	X	X
Black Swan	<i>Cygnus atratus</i>	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Black-fronted Dotteral	<i>Eseyornis melanops</i>	X	X	X				X	X	X	X					X		X	X	X				X	X				X			X							X
Black-tailed Native-hen	<i>Gallinula ventralis</i>	X						X		X	X	X														X		X			X								

Black-winged Stilt	<i>Himantopus himantopus</i>	X		X		X		X						X	X					X	X	X		X	X	
Blue-billed Duck	<i>Oxyura australis</i>			X											X											
Brolga	<i>Grus rubicindus</i>														X											
Buff-banded Rail	<i>Gallirallus philippensis</i>			X																						
Caspian Tern	<i>Hydroprogne caspia</i>																								X	
Cattle Egret	<i>Ardea ibis</i>			X											X											
Chestnut Teal	<i>Anas castanea</i>			X		X					X															
Domestic Goose*	<i>Anser anser</i>												X													
Dotteral/Plover sp.													X													
Double-banded Plover	<i>Charadrius bicinctus</i>					X					X															
Dusky Moorhen	<i>Gallinula tenebrosa</i>	X		X		X								X						X	X	X	X	X	X	X
Eastern Great Egret	<i>Ardea alba</i>	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Eurasian Coot	<i>Fulica atra</i>	X		X	X	X	X		X	X	X			X						X	X	X	X	X	X	X
Freckled Duck	<i>Stictonetta naevosa</i>																								X	
Glossy Ibis	<i>Plegadis falcinellus</i>			X																						
Golden-headed Cisticola	<i>Cisticola exilis</i>					X																			X	
Great Cormorant	<i>Phalacrocorax carbo</i>	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Great Crested Grebe	<i>Podiceps cristatus</i>			X	X	X		X			X									X	X	X	X	X	X	
Grey Teal	<i>Anas gracilis</i>	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Hardhead	<i>Aythya australis</i>	X		X	X	X		X			X	X	X		X					X	X	X		X	X	X
Hoary-headed Grebe	<i>Poliiocephalus poliocephalus</i>			X							X				X					X	X			X	X	
Intermediate Egret	<i>Ardea intermedia</i>	X		X		X	X	X			X				X					X	X	X	X		X	X
Latham's Snipe	<i>Gallinago hardwickii</i>					X																				
Little Black Cormorant	<i>Phalacrocorax sulcirostris</i>	X	X	X	X	X	X	X	X	X		X	X		X					X	X	X	X	X	X	X
Little Egret	<i>Egretta garzetta</i>													X												

