
MONITORING WATERBIRD ACTIVITY IN MILLEWA FOREST: 2015 – 2016



Monitoring Waterbird Activity in Millewa Forest 2015-2016

Report Title: Monitoring waterbird activity in Millewa Forest: 2015-16.

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Front cover photo: Nankeen night herons, Reed Beds South (NSW Parks), fresh royal spoonbill chicks at south Reed Beds (Emma Wilson, OEH).

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SUMMARY

Murray Valley National Park provides a number of known colonial waterbird nesting sites. Monitoring of waterbird breeding events has been undertaken in the forest since 1999. During the 2015-16 water season, environmental water was delivered to Millewa Forest from mid-August to late January. The commencement of a small waterbird breeding event required additional environmental water to be delivered until the end of January, to ensure that the breeding event reached a successful conclusion. This report presents the results of the intervention monitoring program undertaken during this environmental flow event.

Three aerial surveys were conducted between the 23rd of October and the 1st of December. These surveys were carried out by both New South Wales National Parks and Wildlife Service (NSW NPWS) and Goulburn Broken Catchment Management Authority. These surveys assisted in identifying the location of colonial waterbird nesting sites, particularly eastern great egrets *Ardea modesta* nesting along the Gulpa Creek cutting and the extent of the breeding event within the Reed Beds wetland complex. Colonial nesting waterbirds were recorded breeding at five sites. The total number of breeding pairs on the wetland monitoring sites within Forest was ~1098. The number of breeding pairs on each wetland supporting nesting colonial waterbirds were:

- Black Swamp – 27 pairs;
- St Helena Swamp – 2 pairs; and
- Reed Beds wetland complex (North, South and Coppingers) - ~1077prs;

Six colonial nesting species were recorded nesting:

- Australasian darter *Anhinga novaehollandiae*;
- little pied cormorant *Microcarbo melanoleucos*;
- eastern great egret;
- Australian white ibis *Threskiornis molucca*;
- straw-necked ibis *Threskiornis spinicollis*;
- royal spoonbill *Platalea regia*.

The monitoring identified 30 species of waterbird utilising the wetland monitoring sites within Millewa Forest. This included the eastern great egret listed on the China-Australia Migratory Bird and Japan-Australia Migratory Bird Agreements

In 2015-16, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) was undertaking a pilot study for the Environmental Watering Knowledge and Research (EWKR) project in Millewa's Reed Beds North. This project involved setting up remote cameras around nesting areas to assess the nesting behaviour of colonial nesting waterbirds. To minimise disturbance to nesting waterbirds, NSW NPWS limited visits to these areas during the breeding season.

1. INTRODUCTION

The Barmah–Millewa Forest is located in the central Murray Valley between the towns of Tocumwal, Deniliquin and Echuca. The forest has been identified as one of the icon sites under the Murray Darling Basin Authority's 'The Living Murray' (TLM) program. The icon site totals 66,600 ha in size. The Millewa portion of the icon site is reserved as the Murray Valley National and Regional Parks comprising the Millewa, Moira and Gulpa Island precincts (hereafter called Millewa Forest). Millewa Forest covers an area of 41,957 ha comprising of Inland Riverine Forests, Inland Floodplain Woodlands, Floodplain Transition Woodlands, Riverine Sandhill Woodlands and Inland Floodplain Swamps (Keith, 2004).

During flood events, the Inland Floodplain Swamps are known to support large numbers of waterbirds including colonial nesting species (e.g. egret and ibis species). Large waterbird nesting events have been recorded within Millewa Forest since early in the 20th century (Mattingley, 1907, 1908). Although these breeding events still occur they are considered to be much smaller in size compared to historical events (Maher, 1993) and occur less frequently (Leslie, 2001). This has been attributed largely to river regulation within the Murray River.

A water recovery initiative was developed as part of the TLM program. The water recovered as part of this initiative is then available for use within the icon sites to achieve ecological objectives as outlined in the Environmental Water Management Plans for each icon site. During the 2015/16 water season, 60GLs of TLM environmental water was delivered to Millewa Forest (Table 1) to ensure that the bird breeding event that had commenced, was able to reach a successful completion. This report presents the results of the intervention monitoring program undertaken during this flood/environmental flow event.

Monitoring Waterbird Activity in Millewa Forest 2015-2016

Source	Approved Volume (ML)	Delivered Volume (ML)
Commonwealth Environmental Water Office	500,000 ML (including 8,000ML for bird breeding in Reed Beds)	366,794 (multi-site flow) - 48,000 losses through Barmah-Millewa
Murray Darling Basin Authority - 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)	Allocations for bird breeding at Reed Beds (6,000)	

Table 1: Environmental Water allocation 2015-16.

Main Objectives:

As Millewa has been recognised as a historically important waterbird breeding ground, it is imperative that conditions in Millewa continue to promote waterbird breeding to ensure waterbird population abundance and resilience. The purpose of intervention monitoring is to locate colonies and monitor their extent, abundance and richness over the breeding season. This provides data which then informs management actions. A number of factors will contribute to waterbird breeding success, water levels being one critical factor. Sudden drops in water level can cause waterbirds to abandon their nests, and possibly abandon their young, greatly reducing the effectiveness of watering actions which aim to promote ecological outcomes and provide increases in waterbird populations.

- Ensure that waterbird colonies can be supported throughout the season.
- Collect data to contribute to an extensive body of data that has been collected over 20 years, to inform targets and progress over this time and feeding into Long Term Intervention Monitoring programs.
- Communicate status of waterbirds and ecological outcomes to stakeholders over the season.
- Quantify success of management actions in real time.

2. METHODOLOGY

2.1 Study Sites

The sites included in the 2015/16 intervention monitoring project were based on:

- on-ground surveys conducted as part of the TLM condition monitoring;
- aerial surveys undertaken to determine extent of flooding and location of colonial waterbird breeding colonies; and
- New South Wales National Parks & Wildlife Service (NSW NPWS) staff knowledge.

During spring 2015/summer 2016, waterbird monitoring was conducted at five sites where colonial nesting waterbirds were identified as breeding. The five sites utilised in 2015/16 were (Figure 1):

- Black Swamp;
- St Helena Swamp;
- Reed Beds North (east and west);
- Reed Beds South; and
- Coppingers Swamp.

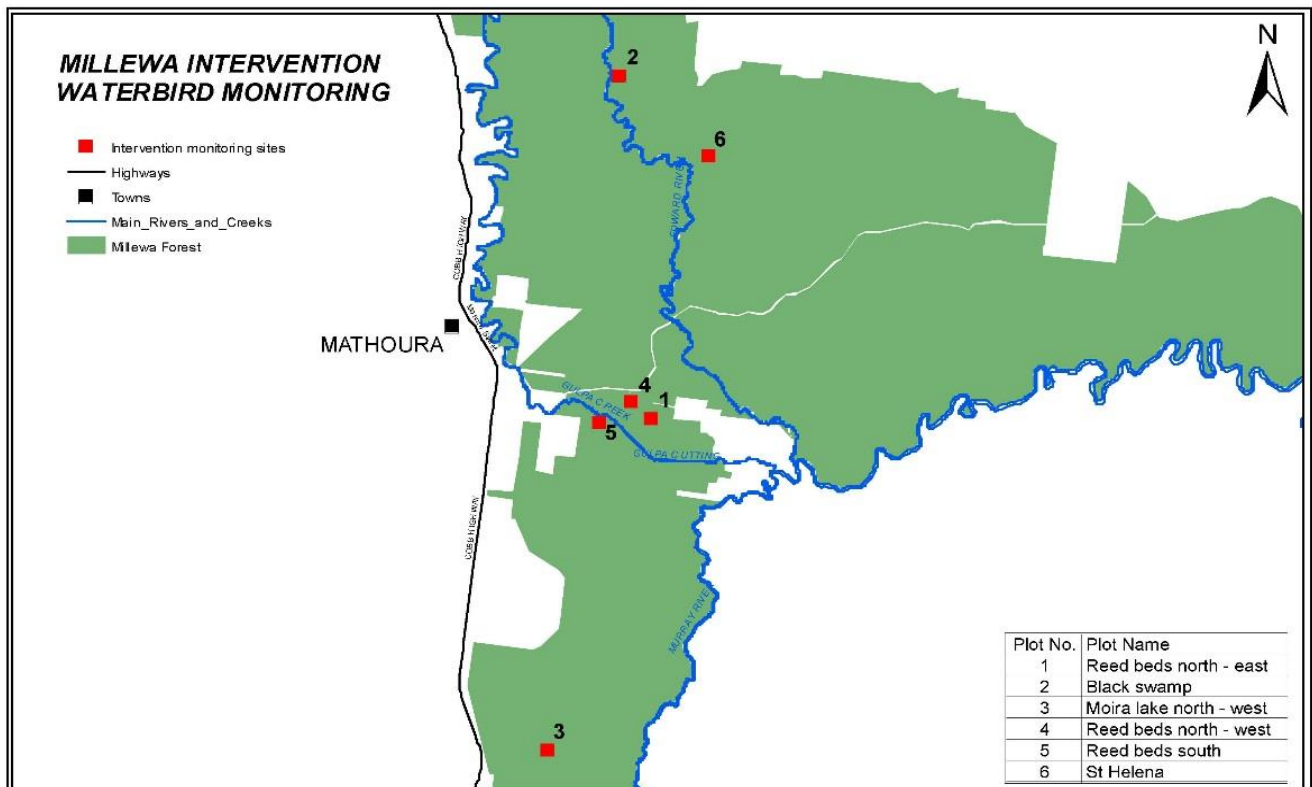


Figure 1: Map of selected intervention monitoring sites within Millewa. This year sites 1,2,4,5 and 6 supported colonial waterbird breeding.

Surveys were carried out from October to February. As CSIRO were also undertaking surveys in Reed Beds North, NSW NPWS conducted fewer surveys in Reed Beds North than it normally would have if CSIRO were not conducting their project work, in order to limit the exposure of the nesting birds to disturbance

2.2 Survey Methodology

To count and identify waterbirds on individual wetlands, a survey transect or a survey point was established. A single traverse of each transect starting and finishing at the survey point was completed for all wetlands except Reed Beds North (west). At Reed Beds North (west) each survey was undertaken from the bird hide located on the northern shore of the wetland. Each transect was located so as to survey as much of the waterbird breeding colony as possible while being undertaken in a manner so as to not unduly disturb the nesting birds. Survey transects were completed from a boat, kayak or on foot depending on the depth of water present within each site. The group of birds known as waterbirds contains a large number of species. For the purposes of this monitoring 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
- Sylviidae (Old World Warblers).

All waterbird species observed on the wetland or flying over were recorded. If a species was breeding then the number of nests, eggs and chicks were also recorded. Surveys were conducted at each site approximately every three weeks throughout the season.

3. RESULTS

Three aerial surveys were conducted between 23rd of October and the 1st December 2015. Goulburn Broken Catchment Management Authority (GB CMA) conducted two of the aerial surveys, and were able to include a portion of the Reed Beds wetland complex (north and south) in their survey. NSW NPWS conducted one aerial survey. This aerial survey identified eastern great egrets nesting in willow trees, along the Gulpa Creek cutting (Figure 1) and allowed estimates of the number of breeding pairs of ibis and spoonbills to be made. Due to the density of the vegetation within the wetland complex it is difficult to accurately assess nesting numbers from the ground. Photos taken during the aerial surveys allowed estimates of nesting colonial waterbirds to be made within the Reed Beds wetland complex as the entire wetland complex was not accessible on ground. These estimates were used to determine the total number of colonial nesting waterbirds utilising the wetland.

A total of six species were recorded nesting in these wetlands. Species recorded breeding were:

- straw-necked ibis *Threskiornis spinicollis* – 430 prs
- Australian white ibis *T. molucca* – 325 prs
- little pied cormorant *Microcarbo melanoleucos* – 41 prs
- eastern great egret *Ardea modesta* – 65 prs
- royal spoonbill *Platalea regia* – 238 prs
- Australasian darter (*Anhinga novahollandiae*) – 6 prs

Nankeen night herons in breeding plumage were present at Gulpa Creek cutting and Picnic Point in large numbers, however no evidence of nesting was found. A single intermediate egret *Ardea intermedia* (in breeding plumage) was also recorded feeding in an area adjacent to the breeding site, however no definite nests were recorded, but it is suspected they may have been nesting among the eastern great egrets.

The 2015/16 intervention monitoring identified 30 species of waterbird utilising the wetland monitoring sites within Millewa Forest (Appendix 1). This included the Australasian bittern *Botaurus poiciloptilus* which is listed as threatened under the NSW threatened species legislation. The Australasian bittern is also listed as endangered under the Commonwealth *Environmental Protection*

and *Biodiversity Conservation Act* (EPBC Act) 1999. Forty-five to 48 male Australasian bitterns were identified at eight wetlands across both Barmah and Millewa during the 2015-16 environmental watering event (Belcher *et al.* 2016). The intervention monitoring surveys identified two Australasian bitterns, calling in Reed Beds north and one Australian little bittern in Reed Beds south.

4. DISCUSSION

The 2015/16 environmental flow event monitoring resulted in the recording of 1105 pairs of colonial waterbirds nesting in the Murray Valley National Park (NP). 427GL of environmental water was used, with 15 300ML delivered specifically to support the waterbird breeding event in the Reed Beds wetlands complex. Use of environmental water for other colonial waterbird nesting events has occurred in 2000-01 (5,008 pairs NSW only, 335GL), 2005-06 (5,421 pairs, 513GL) and 2010-11 (7,420 pairs, 428GL) (Webster 2012). The larger response of colonial nesting waterbirds in 2000-01, 2005-06, 2010-11 and 2011-12 compared to 2015-16 could be due to one of the following reasons but is more likely to be due to a combination of these factors:

- The larger breeding populations in 2000-01 and 2010-11 could be due to the larger flow events that occurred in these two years. In 2000-01, peaks of ~70GL and ~90GL were recorded in September and October/November, and in 2010-11 peaks of ~100GL and ~110GL were recorded in September and December. In 2015-16, the peak flow only reached 16GL in August and flows did not exceed 15GL after early September, which provided an inundation event that was a fraction of the size of the previous years. Figure 2 plots the relationship between discharges from Yarrawonga and the number of individual waterbirds recorded utilising wetlands within Barmah-Millewa forest. This indicates that the lower flows in 2015-16 may have resulted in smaller numbers of colonial nesting waterbirds utilising Murray Valley NP.
- The 2000-01, 2005-06 and 2010-11 breeding events occurred during flood events following extended dry periods (4-5 years) when very little flooding occurred within the park, compared to the 2011-12 breeding event which followed a larger flood event in 2010-11. The inundation of wetlands and surrounding floodplains following extended dry periods appears to result in larger numbers of waterbirds moving into these areas to take advantage of increased resources.

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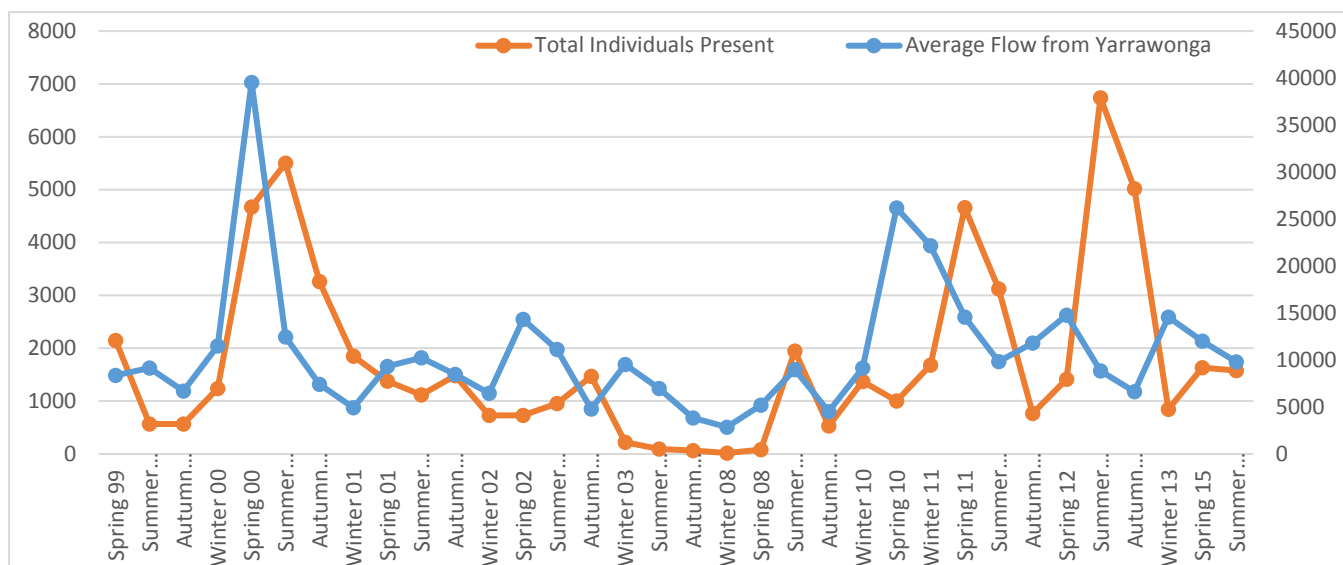


Figure 2: Average flows discharged from Yarrawonga by season, versus the number of individual waterbirds found utilising wetlands across Barmah-Millewa forest. The trend between the two illustrates the complexity of the system. Delays in the number of waterbirds responding to high flows demonstrates the flow on effects of large inundation events, which could perhaps extend across years beyond the event. Low numbers of waterbirds corresponded to continual low flows, which were seen over the millennium drought, particularly in 2008.

The provision of additional environmental water during the 2015/16 breeding event ensured that the recession of water over the hotter summer months was slowed thus preventing the draining of the wetlands supporting the breeding species and therefore the abandonment of nests. During the 2015/16 flow event, environmental water was supplied from the following sources:

- TLM environmental water allocation;
- Commonwealth environmental water holder; and
- NSW Office of Environment & Heritage.

These targeted flows allowed the successful fledging of young waterbirds, and the risk of declining water in the Reed Beds complex which was identified early in the breeding event was avoided. Unfortunately, this was not able to be carried out for all wetlands. Little Pied Cormorants were found nesting at St Helena Swamp, Black Swamp and Coppingers Swamp, in low numbers (2, 13, 16 nests respectively) (Appendix 2). Within St Helena and Black Swamp, there were a number of nests located in trees on the periphery of the wetlands. As the larger environmental flow finished, water levels dropped. This resulted in water levels dropping from beneath the nest trees, causing up to 40 nests to be abandoned. The presence of predated eggs on the ground around the nests indicated that the cormorants were up to the egg laying stage when the environmental flow to this part of the forest finished. Most of the abandoned nest trees were no longer inundated by water, suggesting that a sudden recession in water caused the cormorants to abandon. Unfortunately, the nesting site

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had not been surveyed prior to the reduction of flows. To prevent this occurring in the future, site visits should be conducted earlier in the season if breeding in other wetlands is suspected to have commenced in order to effectively monitor the activity of waterbirds. If identified earlier, measures may have been able to be taken to sustain water levels in these wetlands and prevent the abandonment of nests. Little Pied Cormorant nests located in Coppingers Swamp and willows along Gulpa Creek cutting successful fledged young.

Maher (1993) recorded large numbers of colonial waterbirds nesting at Duck Lagoon during five flood events in 1979-1988 period. Duck Lagoon (including the adjoining Coppingers Swamp) was destroyed in 2008 by wild fire. The habitat within Duck Lagoon and Coppingers Swamp is slowly recovering with the giant rush *Juncus ingens* and a small number of river red gums *Eucalyptus camaldulensis* becoming established. In 2015/16 these habitat features supported a small numbers of Royal Spoonbills (Giant Rush) and Little Pied Cormorants (river red gum). Maher (1993) also recorded nesting in the Reed Beds wetland complex (four years in nine), comprising of ibis and spoonbill species. Nesting ibis (Australian white ibis and straw-necked ibis) pairs varied from 100 (1981/82) to 600 (1978/79) to 990 (2011/12) to 430 pairs (current year). The corresponding numbers for the Royal Spoonbill are 1 (1985/86) to 30 (1983/84) compared to 230 pairs in 2015/16.

A smaller number of wetlands (5) were recorded with breeding present this year. This is a result of the smaller natural flood peaks and that occurred and the lower volumes of environmental water that were delivered during the 2015/16 water year. In 2011-12, 6 wetlands within Millewa facilitated breeding. This included sites around Moira Lake which are difficult to keep inundated unless flows within the main stem of the Murray River are maintained at >20,000ML per day at Yarrawonga Weir. This was not the case this year, with the peak flow below Yarrawonga Weir being 15,254 ML/day.

In previous years (such as in 2010-11), nankeen night herons have been recorded nesting in Millewa. At least 250 pairs of nankeen night heron's nested at the western end of Gulpa Creek cutting during the 2010/11 event. Since this breeding event occurred nankeen night herons have been recorded at the breeding site each year and even though the majority of these birds have been in breeding plumage they have failed to establish nests. This species is usually the last to begin nesting, and may require high river flows through November and possibly into December to encourage them to commence nesting.

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6. APPENDIX 1

Survey site		Black Swamp	Coppingers Swamp	St Helena	Reed Beds North	Reed Beds South
Common Name	Scientific name					
Australian Little Bittern	<i>Ixobrychus dubius</i>				X	
Australian Pelican	<i>Pelecanus conspicillatus</i>	X		X	X	X
Australian Reed-warbler	<i>Acrocephalus australis</i>			X	X	X
Australian White Ibis	<i>Threskiornis molucca</i>	X		X	X	X
Australian Wood Duck	<i>Chenonetta jubata</i>	X		X		X
Australasian Bittern	<i>Botaurus poiciloptilus</i>				X	
Australasian Darter	<i>Anhinga novaehollandiae</i>	X	X	X		X
Australasian Grebe	<i>Tachybaptus novaehollandiae</i>				X	
Black Swan	<i>Cygnus atratus</i>	X			X	
Eastern Great Egret	<i>Ardea alba</i>	X		X	X	X
Eurasian Coot	<i>Fulica atra</i>				X	
Great Cormorant	<i>Phalacrocorax carbo</i>				X	X
Great Crested Grebe	<i>Podiceps cristatus</i>					
Grey Teal	<i>Anas gracilis</i>	X		X	X	X
Hardhead Duck	<i>Aythya australis</i>			X		
Little Black Cormorant	<i>Phalacrocorax sulcirostris</i>	X	X		X	X
Little Grassbird	<i>Megalurus gramineus</i>				X	
Little Pied Cormorant	<i>Microcarbo melanoleucos</i>	X	X	X	X	X
Nankeen Night Heron	<i>Nycticorax caledonicus</i>				X	X
Pacific Black Duck	<i>Anas superciliosa</i>			X	X	X
Purple Swamphen	<i>Porphyrio porphyrio</i>			X		
Royal Spoonbill	<i>Platalea regia</i>	X	X	X	X	X
Sacred Kingfisher	<i>Todiramphus sanctus</i>			X	X	
Straw-necked Ibis	<i>Threskiornis spinicolis</i>				X	X
Swamp Harrier	<i>Circus approximans</i>					X
Whistling Kite	<i>Haliastur sphenurus</i>			X	X	
White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>	X		X		
White-faced Heron	<i>Ardea novaehollandiae</i>	X		X	X	
White-necked (Pacific) Heron	<i>Ardea pacifica</i>	X		X		X
Yellow billed-spoonbill	<i>Platalea flavipes</i>	X		X		

Notes:

Bold = Threatened species

7. Appendix 2 -

Extra Colony Nesting Record Sheets

Black Swamp

Date: 1/12/2016

Time: 10:00

Water Level (%): 75

Understorey: Water

Water depth (m)	Nest Height		Nesting Veg	Waterbird Species	Nesting Stage	Total active (empty) nests per tree/shrub	Notes
	Min	Max					
0.3	1	3.5	Dead RRG	Little Pied Cormorant	Nestlings, 1/4 to 3.4 grown	2.5 (2-9 nests per tree)	12 adults sitting. Chicks in nests: 1-4 2-7 3-2
0.3	1	3.5	Dead RRG	Australasian Darter	Nestlings	1	Chicks: 1-2
0	1.8	4	RRG	Little Pied Cormorant	Eggs	48 nests abandoned	3 Predated eggs found on ground under nests.

St Helena

Date: 1/12/2015

Time: 11:47 – 12:27

Water Level (%): 65

Understorey: Water

Water depth (m)	Nest Height		Nesting Veg	Waterbird Species	Nesting Stage	Total active (empty) nests per tree/shrub	Notes
	Min	Max					
0.3	0m		Dead RRG	Little Pied Cormorant		2 Active, 12 abandoned, 35 abandoned with eggs.	2 nests with 3 chicks in each.

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Coppingers Swamp

Date: 23/11/2015

Time: 12:40 – 14:00

Water Level (%): 85

Understorey: Giant Rush, Water

Water depth (m)	Nest Height		Nesting Veg	Waterbird Species	Nesting Stage	Total active (empty) nests per tree/shrub	Notes
	Min	Max					
0.3	0m		Giant rush (<i>Juncus Ingens</i>)	Royal Spoonbill	Eggs	8 active.	14% of nests: 1 egg 29% of nests: 2 eggs 57% of nests: 0 eggs

Little pied cormorants and little black cormorants also seen nesting in inundated red gums.