

Final report:

Bird Assessment Surveys in the Coorong, Lower Lakes and Murray Mouth Region 2014

Prepared For:

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birds are in our nature

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Contents

Contents	2
Introduction	3
Background	3
Scope	3
Study Area	3
Methodology	4
Literature and Database Review	4
Field Surveys.....	4
Data Analysis	11
<i>Vegetation groups</i>	11
<i>Number of species</i>	11
<i>Survey effort</i>	12
<i>Reporting rates – common and threatened species</i>	12
Data Management	12
Survey Limitations	12
Results	14
<i>Number of species</i>	14
<i>Survey effort</i>	16
<i>Reporting rates of common species</i>	19
<i>Threatened species</i>	20
Discussion	25
References	28
Appendix 1 Waypoint site ID, vegetation, ecosystem ID and treatment of 2014 sites	29
Appendix 2 Species list – birds	31
Appendix 3 Species list – mammals, frogs, reptiles	32
Appendix 4 Bird species observed in one year and not the other	33
Appendix 5 Number of species recorded at each site in 2014 – remnant and 10+ (species highlighted recorded only in remnant sites)	35
Appendix 6 Number of records of each species at each site in 2014 – 5+, 2-4 and ≤1	40
Appendix 7 Reporting rates for all species from 2013 and 2014 surveys by revegetation age	45
Appendix 8 Reporting rates for all species from 2013 and 2014 surveys by ecosystem ID	52



Introduction

Background

The Department of Environment, Water and Natural Resources (DEWNR) Coorong, Lower Lakes and Murray Mouth (CLLMM) Recovery Project is delivering a five year restoration project in the CLLMM region. This project forms part of the Vegetation Monitoring and Research Project Plan, part of the CLLMM Vegetation Program. The Coorong, Lower Lakes Program began in 2009 as part of the Commonwealth's Bioremediation and Revegetation Project. Works were undertaken as an emergency response to the prolonged drought. Before water returned to the Lower Lakes system in mid-2010, the Bioremediation and Revegetation Project was designed to build community spirit and support for the broader program, and capacity of local community groups to have the skills, experience and equipment necessary to be involved in the ongoing environmental care of the region.

The purpose of this project was to fill spatial gaps in bird knowledge across the CLLMM region. This will help inform and improve the continued delivery of the vegetation program through better design of habitat restoration strategies.

The bird assessment surveys were undertaken to gather baseline data on species distribution and density, as well as on area of occupancy for individual species, across different environmental settings. Bird surveys in 2013 were conducted at 63 sites and at 49 sites in 2014. Sites were selected to represent the dominant environmental settings in a range of landscapes, including remnant patches, restored patches and modified sites.

The results of these surveys are to be applied to the greater CLLMM recovery project for assisting decisions as to whether any particular environmental settings are under threat and require restoration, and determining how restored sites are tracking towards a desirable state.

Scope

This project scope consisted of conducting bird surveys at 50 sites in remnant native, modified and restored vegetation across the CLLMM region.

The scope of the works was as follows:

- Assemble and coordinate a field crew for the bird surveys;
- Undertake field-based bird surveys at the 50 identified sites;
- Enter bird survey data into the DEWNR supplied Microsoft Access database; and,
- Write a high-quality report summarising the bird survey results.

Study Area

This project forms part of the Vegetation Program Research and Monitoring activities, with study sites located in the CLLMM region of South Australia, approximately 65 kilometres south-east of Adelaide.

Bird surveys in 2014 were to be undertaken at 50 sites located throughout the CLLMM region (Figure 1 and Figure 2). Forty two of these are located within, and seven outside, the CLLMM border (Figure 2).



Methodology

Literature and Database Review

The following resources and databases were reviewed over the duration of the project:

- BirdLife Australia's Atlas Project Database;
- BirdLife Australia's Shorebirds 2020 Database;
- The Atlas of Living Australia (ALA);
- Department of the Environment (DoE) Protected Matters Search Tool which identifies matters of National Environmental Significance (e.g. listed fauna species, ecological communities and Ramsar wetlands) protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DoE 2014);
- Known ecological reports relevant to the CLLMM area.

Field Surveys

A total of 50 sites in 2014 were located throughout the CLLMM region (as defined by DEWNR). One site was unable to be surveyed due to landholder objections, resulting in a total of 49 sites surveyed in the 2014 season. Bird surveys were all conducted in spring (October – November) in 2014. Sites east of Lake Alexandrina and Lake Albert were surveyed 28/10/2014-3/11/2014 and those to the west of the lakes were surveyed 3/11/2014-8/11/2014.

Landowners were contacted within one week prior to each site visit, following instructions from DEWNR. Sites were accessed by either vehicle or on foot, depending on the proximity of the site to the nearest public road or landholder's private access point. All assessments were undertaken on foot with 10x42 binoculars and observations were entered onto datasheets.

All surveys were undertaken by four BirdLife staff working in pairs. Each pair consisted of one highly experienced and one other BirdLife Australia staff member. All BirdLife Australia staff have a minimum of 10 years birding and bird identification experience including call identification.

Methodology implemented was as per the original project brief, and is outlined below:

Structured surveys:

- The survey areas consisted of pre-determined 2 ha sites. GPS waypoints were provided by DEWNR for each site to locate the centre point of the assessment area.
- Weather conditions and any other observations relevant to the visit (e.g. flowering species) were recorded at the start of each survey. The species observed, including whether it was in or out of the assessment area, method of observation, and any notes relating the species (e.g. feeding, flying, etc) were recorded. These data were recorded on the datasheets provided.



- At each visit a 20 minute search for bird species over a 2 ha area surrounding the waypoint (= 80 metre radius) was undertaken.
- Records included both observed and heard species within the 2 ha plot. Reference calls were available through portable devices and used to confirm ambiguous or novel bird calls.
- Each site was visited on three separate occasions. While the original brief was to conduct the three visits on three different mornings, after visiting the sites during both morning and afternoon periods no major difference in bird species diversity, abundance or detectability was apparent. To be consistent with the 2013 survey methodology, two morning surveys and one evening survey were conducted at each of the 49 sites. Each site, except 570 (site name CLL566), was visited on a different day once in the early morning, once in the late morning and once in the evening. Site 570 was visited in the early morning and evening on the same day due to access issues.
- Morning surveys generally commenced within 4 hours of sunrise, unless weather conditions were suitable for further surveys to be undertaken after this time (i.e. mild conditions, birds still actively calling, detectability unchanged from early morning).
- Evening surveys were generally conducted within 4 hours of sunset.
- Species were recorded, not individuals. Species were recorded only once on the datasheet against each visit.
- Any observations of other vertebrate species that could be identified to Genus level were also recorded (e.g. rabbits, goats, deer, or kangaroos from tracks, scats, skeletons etc.).
- The 5 minutes at the end of the 20 minute bird survey were used to look for signs of other vertebrate species. These were recorded on the same datasheet using the same codes.

Opportune records:

- Opportune records were noted to assist in the identification of sub-landscape distribution of species that are characteristic of the area
- When taking opportune records, surveyors spent 30 seconds recording any other species that were detectable in the immediate area.
- Opportune records were recorded straight onto the same datasheet using Waypoint IDs that were pre-assigned to individual observers.
- Whilst species recorded opportunistically have been included in the overall species list, if they were not recorded during the fixed 20 minute 2 ha surveys, they have not been included in the analysis below.

The study landscape and the distribution of sites can be seen in Figures 2-4.

Figure 1

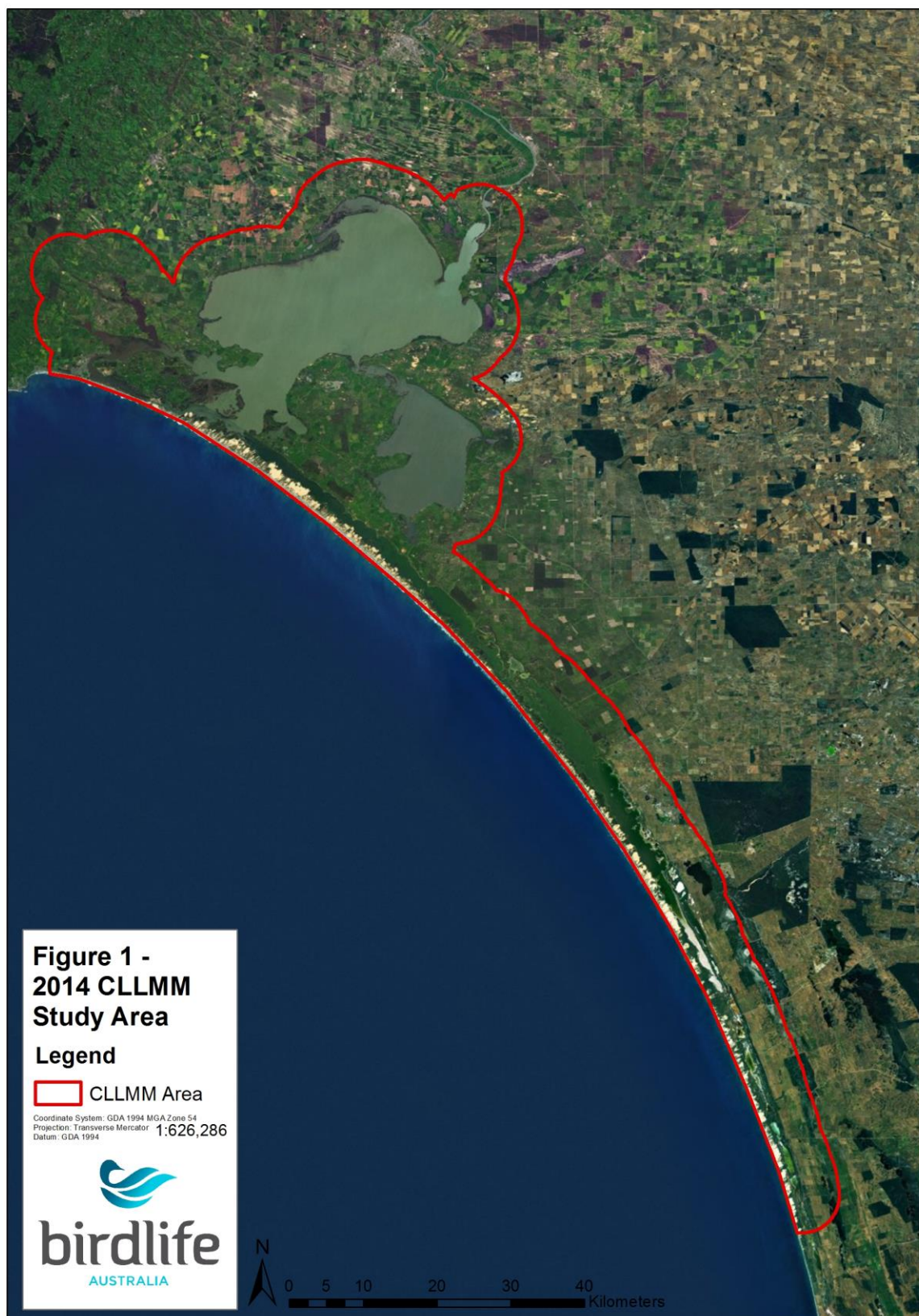


Figure 2

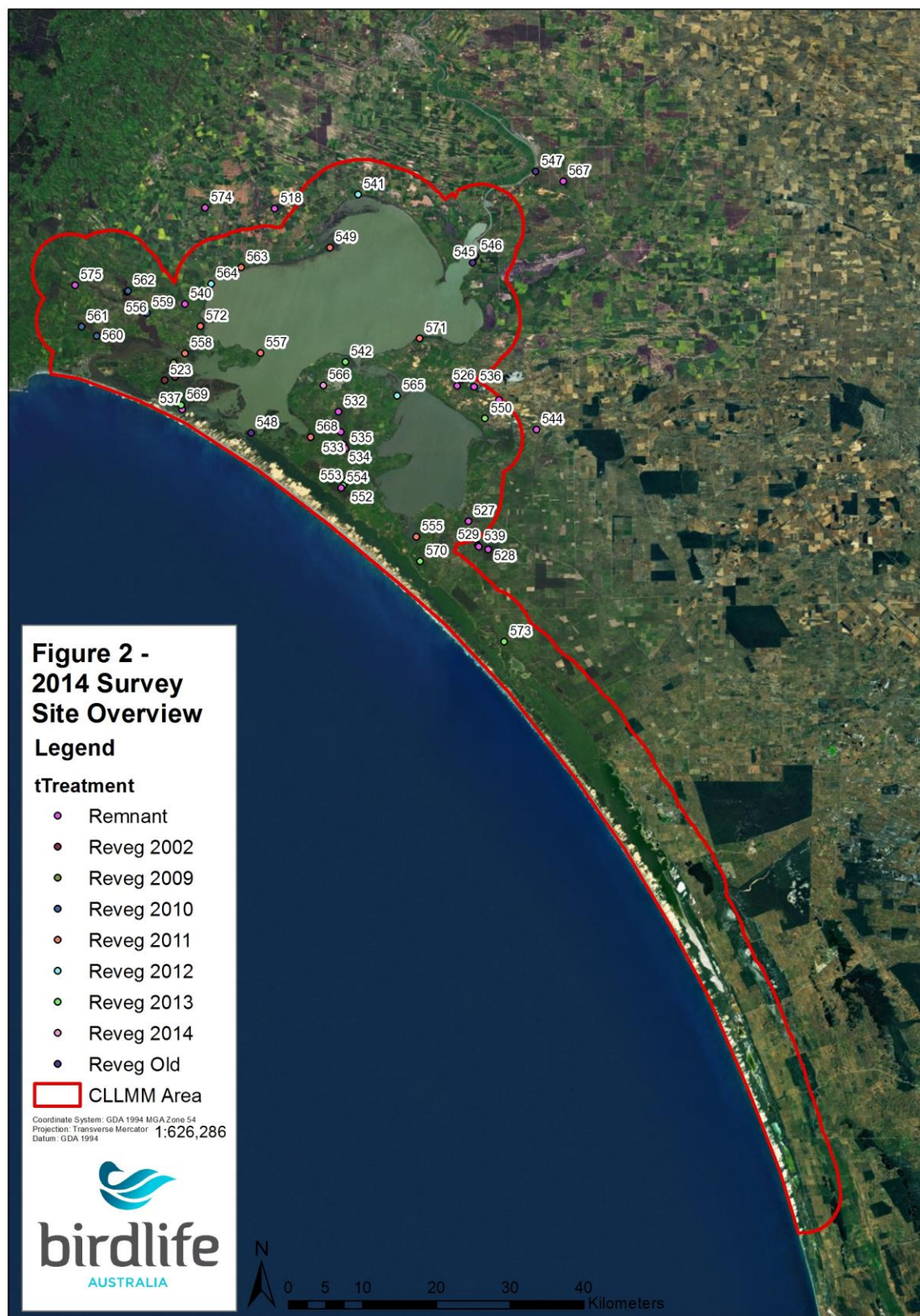


Figure 3

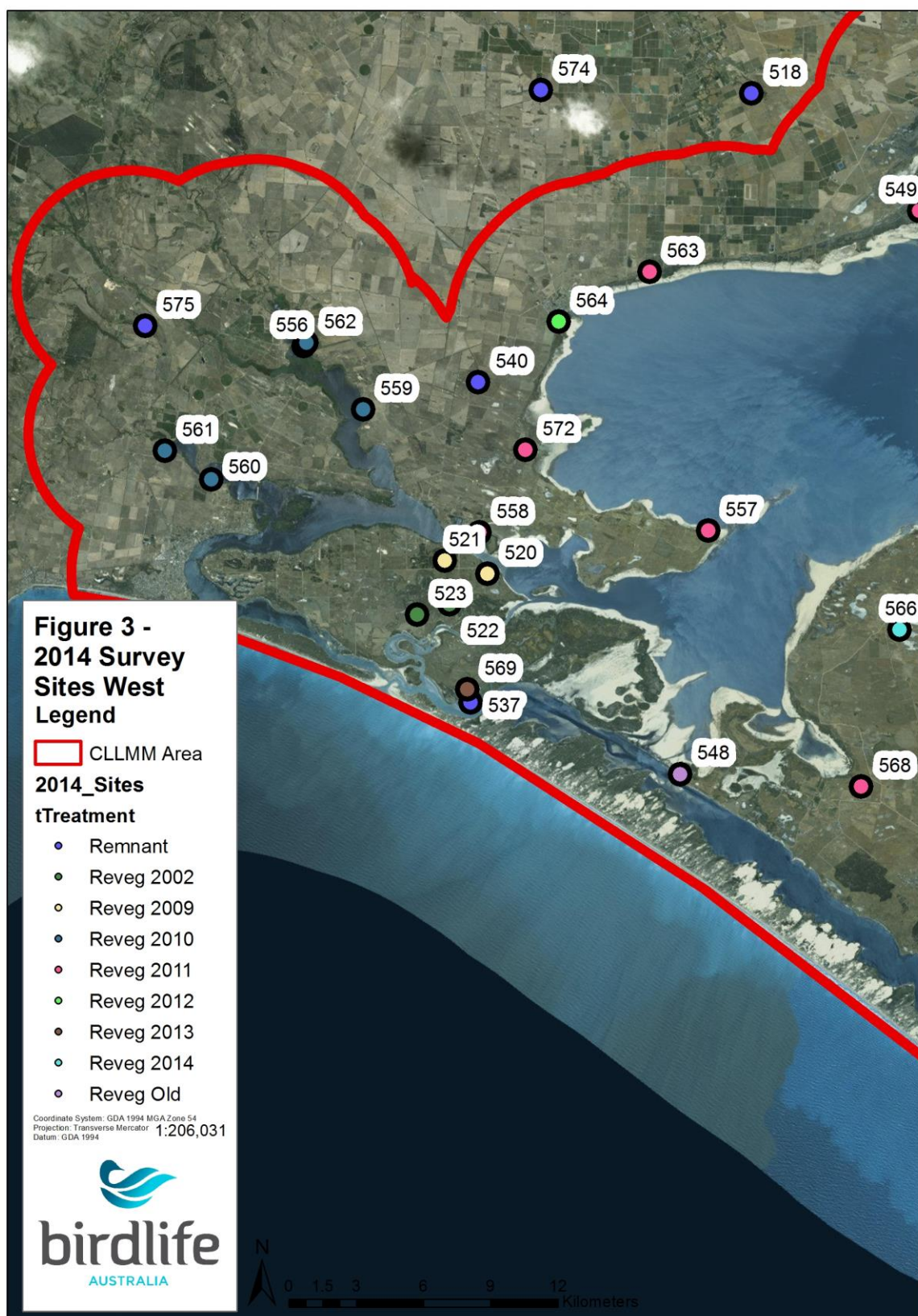


Figure 4

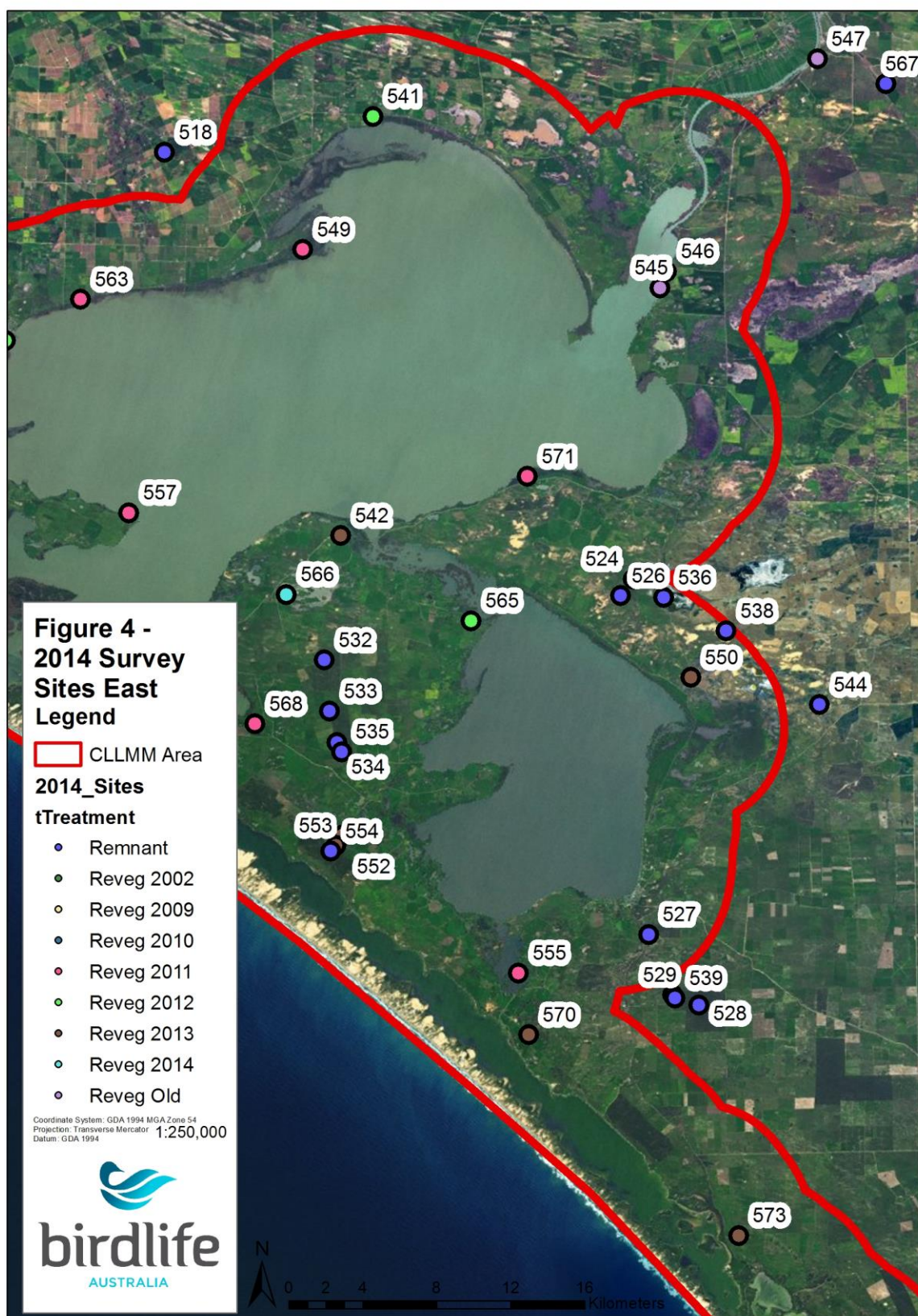
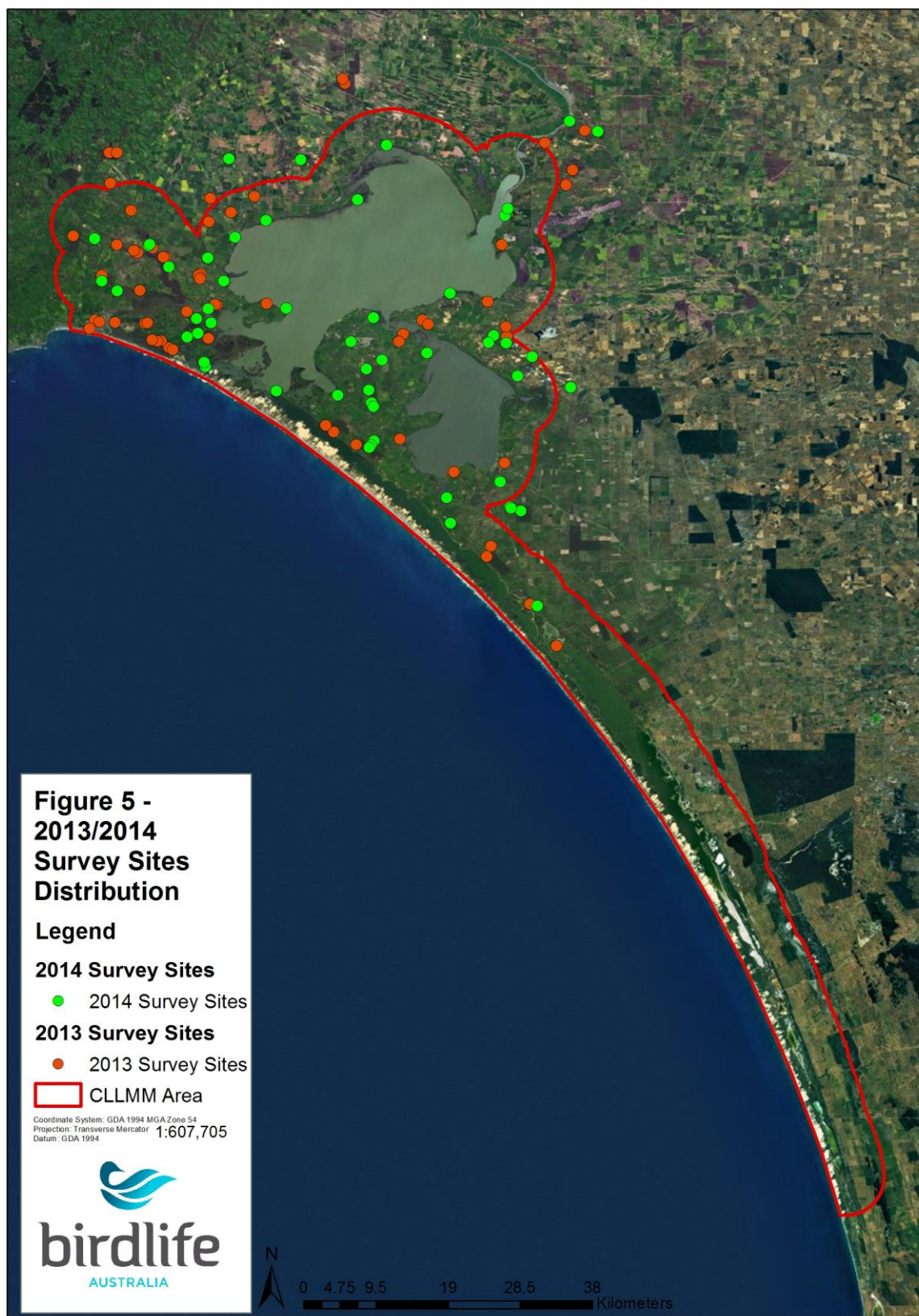


Figure 5





Data Analysis

Vegetation groups

Analyses for this report included data collected in bird surveys from 2013 and 2014 at remnant and revegetated sites of differing age (see Table 1). The revegetated sites were grouped into four treatments (groups of revegetation age classes). These included sites revegetated:

- more than 10 years ago, "RevegOld" and "Reveg02", referred to as "10+" throughout the report;
- more than 5 but less than 10 years ago, "Reveg09", referred to as "5+";
- 2-4 years ago, "Reveg10", "Reveg11" and "Reveg12", referred to as "2-4";
- less than 1 to 1 year ago, "Reveg13" and "Reveg14", referred to as " ≤ 1 ".

The groupings were based on discussions with Sacha Jellinek and reflect the differences in methods and the age of revegetation. For example, revegetation undertaken in 2009 was outside of the current program, whereas revegetation undertaken in 2010, 2011, 2012, 2013 and 2014 are all part of the current program.

Table 1. Classification of revegetation groups.

Treatment	Revegetation age class*	Year Surveyed
Remnant	Remnant	2013
	Remnant	2014
RevegOld	+10	2014
Reveg02	+10	2014
Reveg09	+5	2014
Reveg10	2-4	2013
	2-4	2014
Reveg11	2-4	2013
	2-4	2014
Reveg12	2-4	2013
	2-4	2014
Reveg13	≤ 1	2014
Reveg14	≤ 1	2014

Number of species

The mean number of species recorded per survey was calculated for each age class, each site and each ecosystem type (Appendix 1). This included all species recorded for each site:

- during the 20 min survey period within 2 ha;
- outside the 20 min survey period within 2 ha;



- during the 20 min survey period outside 2 ha.

Survey effort

Results were pooled for each of the treatment types and species accumulation curves were generated for the 2014 data. Survey data for days was pooled. This gives a general overview of the efficacy of the survey protocol and effort.

Reporting rates – common and threatened species

Common species are those that are abundant and widespread. These species are often those that are encountered most frequently during surveys. Reporting rates can thus give an indication of how common a particular species is in the study area. Reporting rates for a species were calculated as the number of surveys that a species was recorded as present, divided by the total number of surveys. Data was pooled according to the aforementioned revegetation age classes (Table 1) and all data from 2013 and 2014 was included. In general, the higher the reporting rate, the more common the species. Reporting rates for threatened species encountered in the 2013 and 2014 surveys were calculated separately.

Data Management

All information collected on datasheets in the field was entered into the Microsoft Access database supplied by DEWNR. Datasheets and database information were returned to DEWNR at the completion of the project.

Survey Limitations

Bird survey data collected during the field surveys and information obtained from relevant sources (e.g. biological databases and relevant literature) were reviewed. This information was considered sufficient to provide an assessment of the avian biodiversity values within the CLLMM area during the survey period.

Although the objective of the assessment was to document avian species diversity within the survey areas, the relatively short duration of the surveys meant that migratory, transitory or uncommon bird species are likely to have been missed. It is possible that more bird species may have been detected had there been additional surveys conducted at each site. Likewise, the diversity and abundance of bird species varies between seasons and across years. Ongoing surveys structured to detect seasonal and temporal variations would rectify these limitations.

Treatment type can play a role on the detectability of some species. At some of the remnant sites the vegetation was dominated by densely growing shrubs. This made observational detection difficult and as such call identification became more important. The use of personnel experienced in identifying birds by call and portable call playback devices ensured accurate call identification. Call playback was also used to confirm the presence of some of the more cryptic species in the landscape. For example at a number of sites that contained potential Southern Emu-wrens call playback was used in an attempt to elicit a response and to detect the species. Similar techniques were used for ambiguous species (such as Brown and Inland Thornbills) with call response, and better observation of the species allowing for confirmation of identification.



The short time frame of the survey did not allow for any extensive analysis of the data. These results show a snap-shot of the birds found at survey sites during the spring of 2014. Further surveys at the sites surveyed in 2013 and 2014 will be required to draw definitive conclusions on habitat use, response of species to revegetation and/or habitat preferences of individual species.



Results

In total 150 fauna species were recorded across surveys in 2014 – 134 birds, 11 mammals, 2 reptiles and 2 frogs (Appendix 2 and 3). Species other than birds were incidental records and not included in the following analyses. Twenty less bird species were recorded in 2014 compared with the 2013 surveys. A total of 37 species recorded in 2013 were not observed in 2014 and 17 observed in 2014 were not recorded in 2013 (Appendix 4).

Nine treatment types were surveyed in 2014, including remnant, old revegetation sites, sites revegetated in 2002, 2009, 2010, 2011, 2012, 2013 and 2014. Table 2 shows the number of sites within each treatment, total number of surveys undertaken within each treatment type and the number of species recorded within each treatment type during surveys. Survey effort across all treatments was not equal. A total of 23 species were recorded only in remnant sites (Appendix 5).

Table 2. Number of sites surveyed in remnant vegetation and within each revegetation age class (* terminology used to refer to the treatments throughout the report).

Treatment	Revegetation age class*	Year	Number sites	Number of surveys	Number of species recorded on site
Remnant	Remnant	2013	31	93	127
	Remnant	2014	19	57	98
RevegOld	10+	2014	4	12	63
Reveg02	10+	2014	2	6	38
Reveg09	5+	2014	2	6	42
Reveg10	2-4	2013	4	12	41
	2-4	2014	4	12	57
Reveg11	2-4	2013	7	21	59
	2-4	2014	7	21	72
Reveg12	2-4	2013	20	60	83
	2-4	2014	3	9	37
Reveg13	≤1	2014	7	21	57
Reveg14	≤1	2014	1	3	19
Total			111	333	

Number of species

Generally higher numbers of species were recorded per survey in the remnant sites and sites revegetated more than 10 years ago compared with more recent revegetation sites (Figure 5, Figure 10). The numbers of species recorded per site for each of the revegetation age classes was highly variable (Figures 6-9). For those ecosystems where remnant and revegetated sites were surveyed, remnant sites generally had higher number of species, although in ecosystem 5 and 9 revegetated sites had higher numbers (though the revegetated sites were much more variable in the mean number of species recorded) (Figure 11). In addition, sample size within the revegetation age classes across the ecosystem types was generally low (1-2) (Figure 10). The number of species recorded at each site in 2014 is listed in Appendix 5.



Figure 5. Mean number of bird species (\pm s.e) recorded per survey for different age revegetation classes (sample size shown above bars).

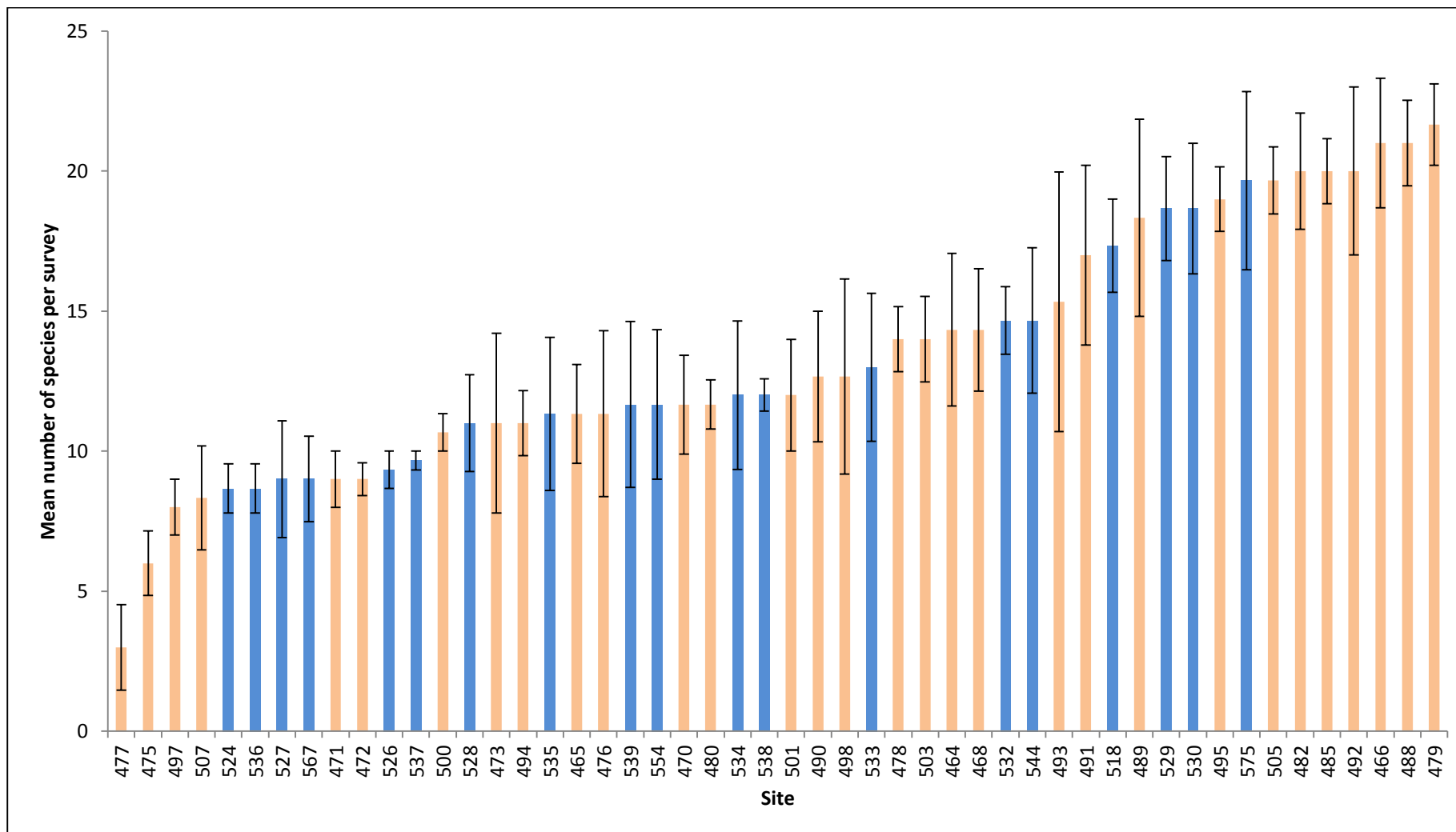


Figure 6. Mean number of bird species (\pm s.e) recorded per survey at remnant sites. Orange bars represent sites surveyed in 2013 and blue bars those surveyed in 2014 (three surveys were conducted at each site).

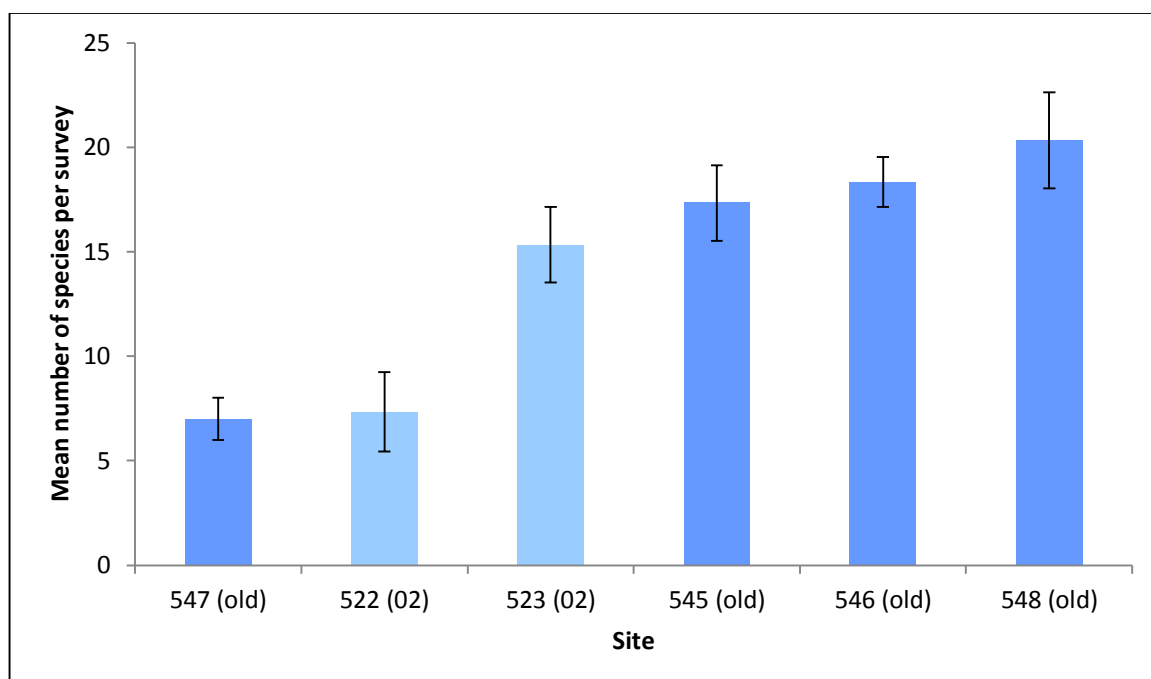


Figure 7. Mean number of bird species (\pm s.e) recorded per survey at sites revegetated more than 10 years ago (10+). In brackets is the actual age (02 = 2002, old = old revegetation, exact age unknown) (three surveys were conducted at each site).

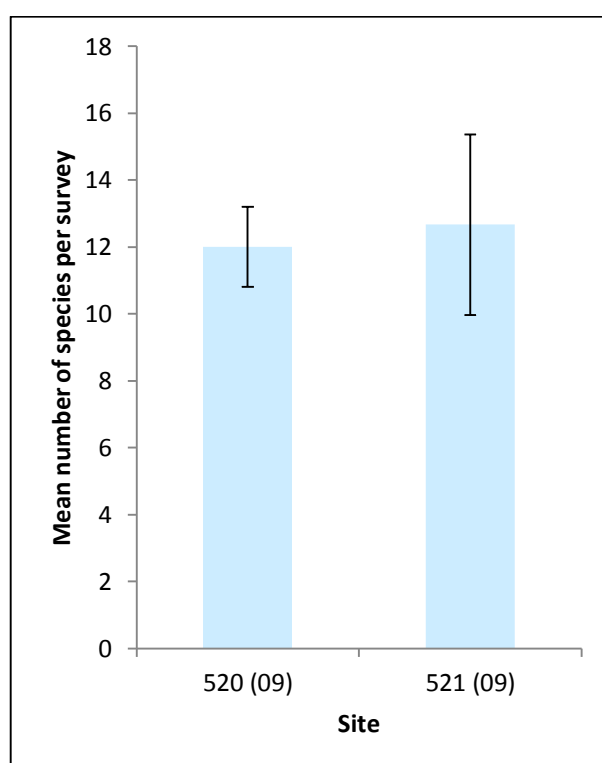


Figure 8. Mean number of bird species (\pm s.e) recorded per survey at sites revegetated more than five years ago (5+). Actual age in brackets (09 = 2009) (three surveys were conducted at each site).

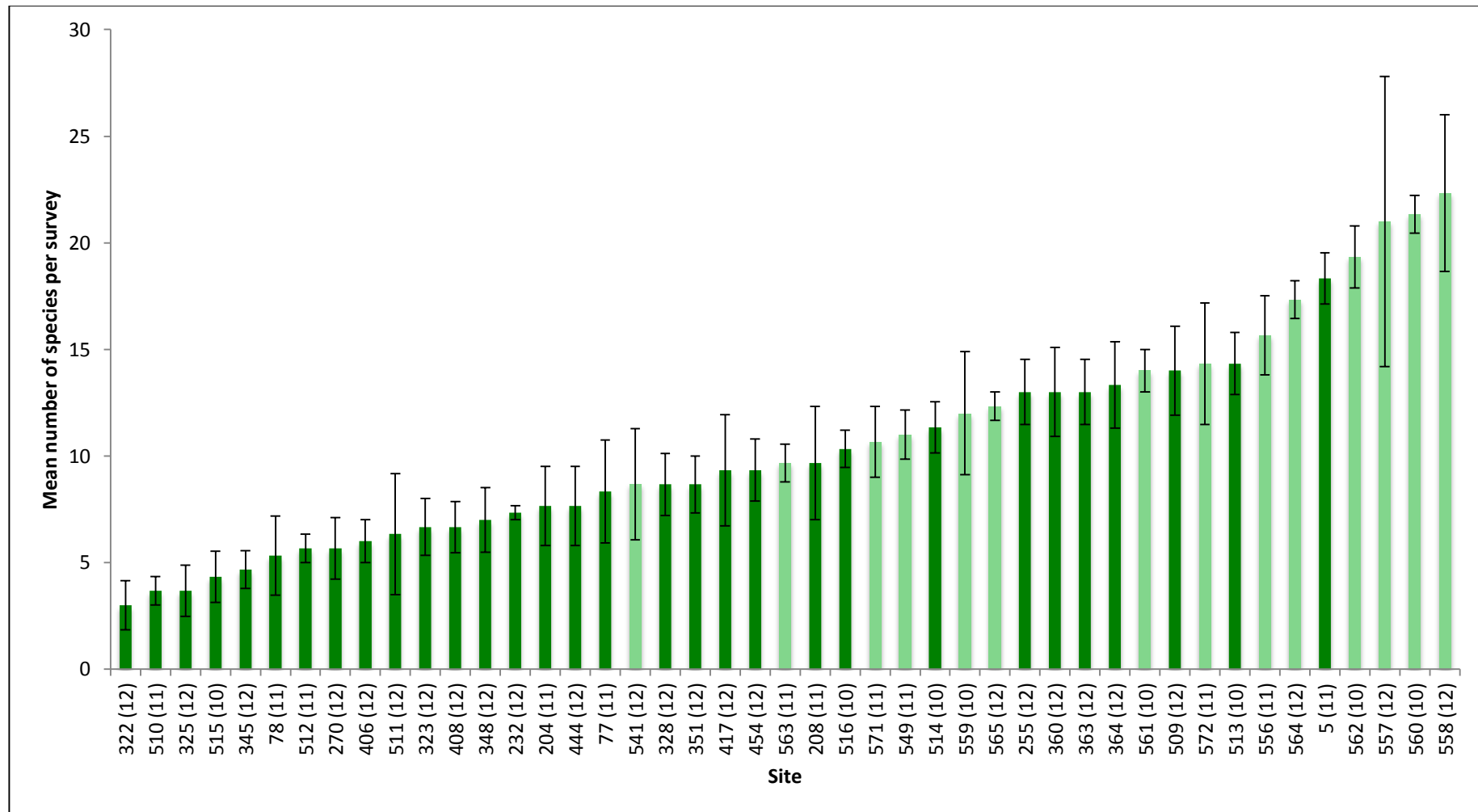


Figure 9. Mean number of bird species (\pm s.e) recorded per survey at sites that have been revegetated in the last 12 months (dark green = 2013 sites; pale green = 2014 sites (three surveys were conducted at each site)).

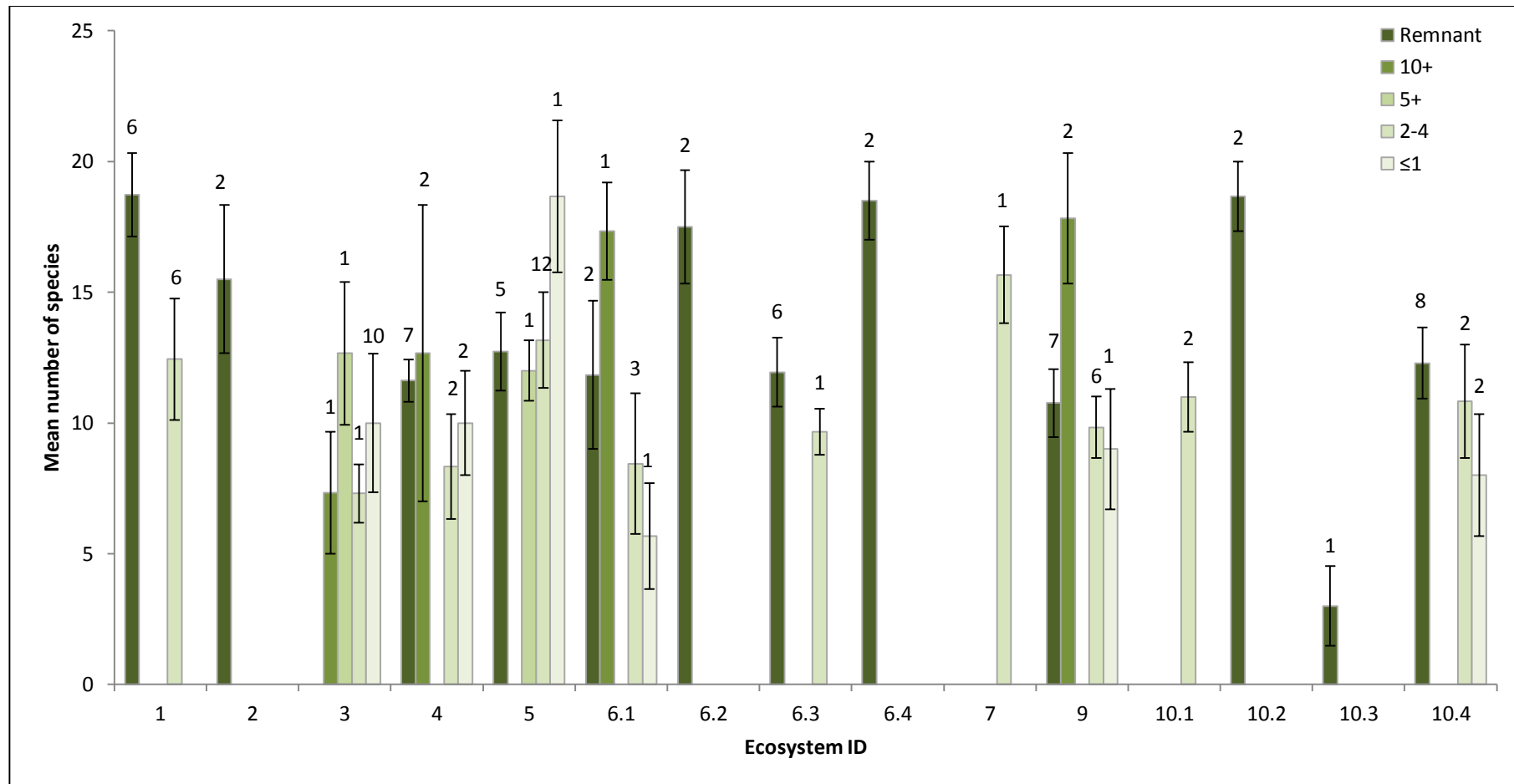


Figure 10. Mean number of bird species (\pm s.e) recorded across surveys (2013 and 2014 data pooled). Numbers across the X axis correspond to the ecosystem IDs listed in Appendix 1 (numbers above bars indicate sample size).

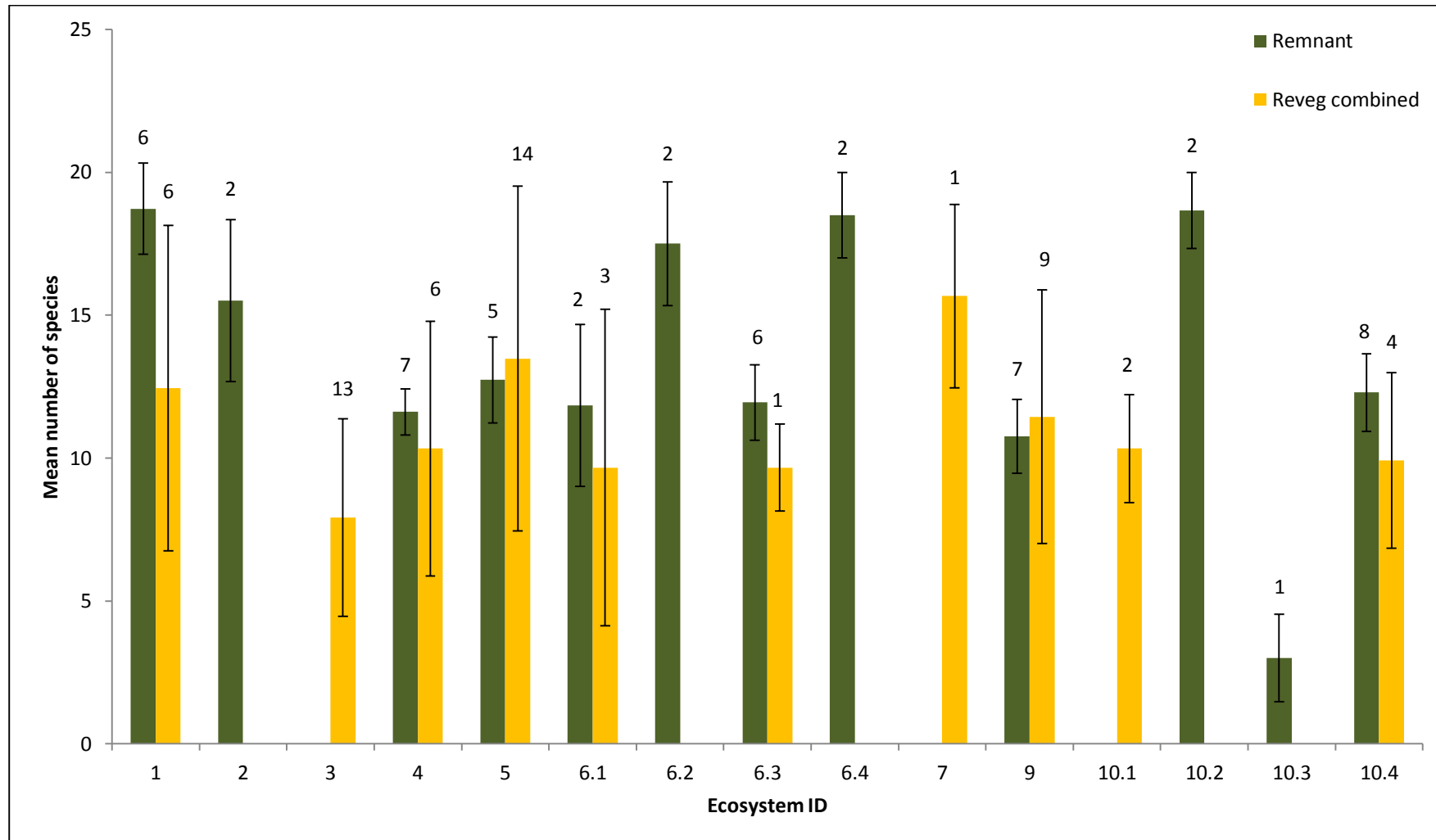


Figure 11. Mean number of species (\pm s.e) recorded across surveys between remnant and all revegetated sites (old, 2002, 2009, 2010, 2011, 2012, 2013, 2014) within each ecosystem ID (listed in Appendix 1) (2013 and 2014 data pooled).

Survey effort

Figure 12 shows the combined survey results and indicates that the current survey regime is sufficient across the region. For three of the five revegetation age classes– 'Remnant' and '2-4' and ' ≤ 1 ' the current survey effort appears to effectively capture the full range of species that is present across these sites. The survey results for the '10+' and '5+' sites fall short of the desired asymptote (flattening) of the species accumulation curve (Figures 12 - 17) suggesting the survey effort was insufficient to capture all the species that may use these sites. Data has been split into species recorded during the standard 20 minute, 2 ha surveys (On site only) and all species recorded at a site; both formal surveys and records outside 20 minutes or 2 ha (All recorded species). The difference between the two lines is generally attributed to the removal of the more aquatic species that occur peripherally to the terrestrial survey sites.

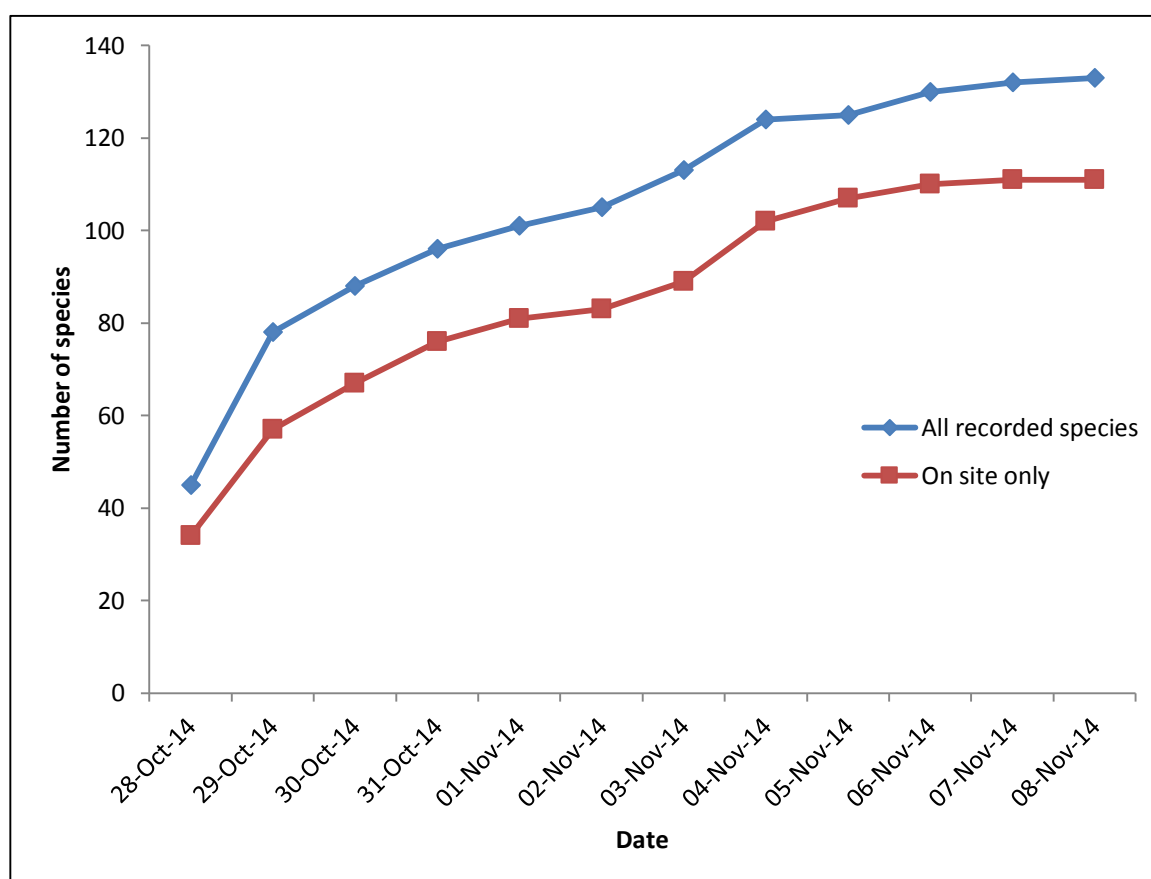


Figure 12. Bird species accumulation curve of recorded species across the survey area. Counts have been tallied for survey days.

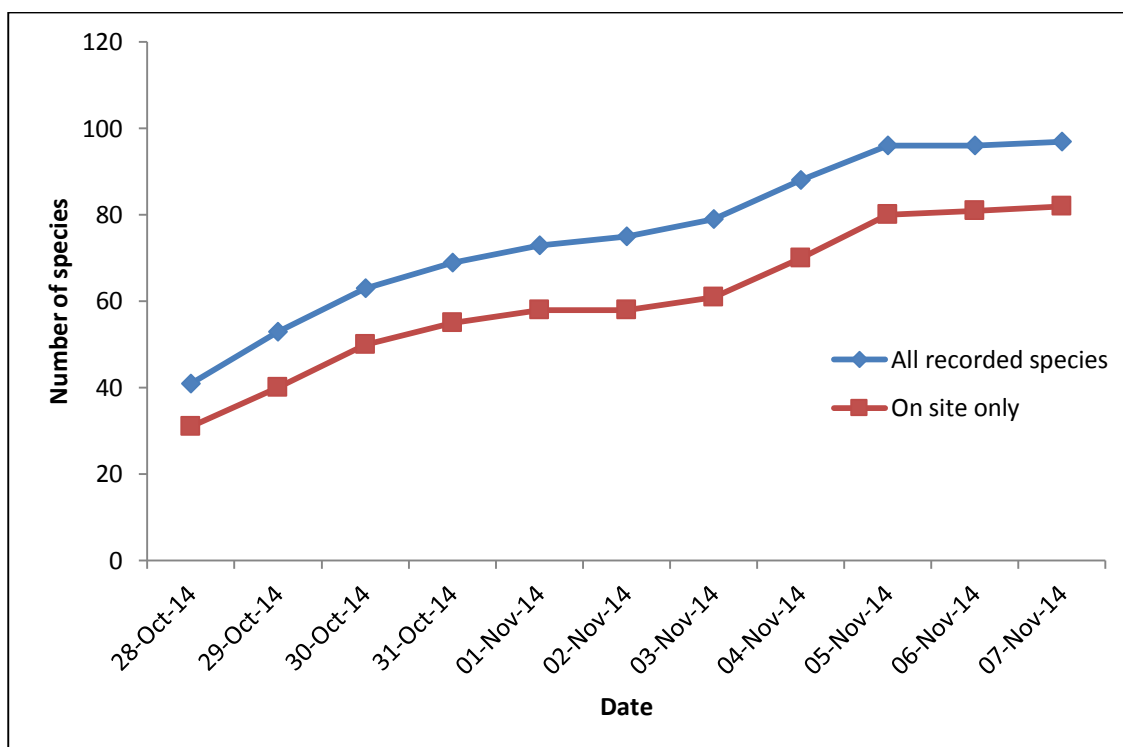


Figure 13. Species accumulation curve for remnant sites. Counts have been tallied for survey days.

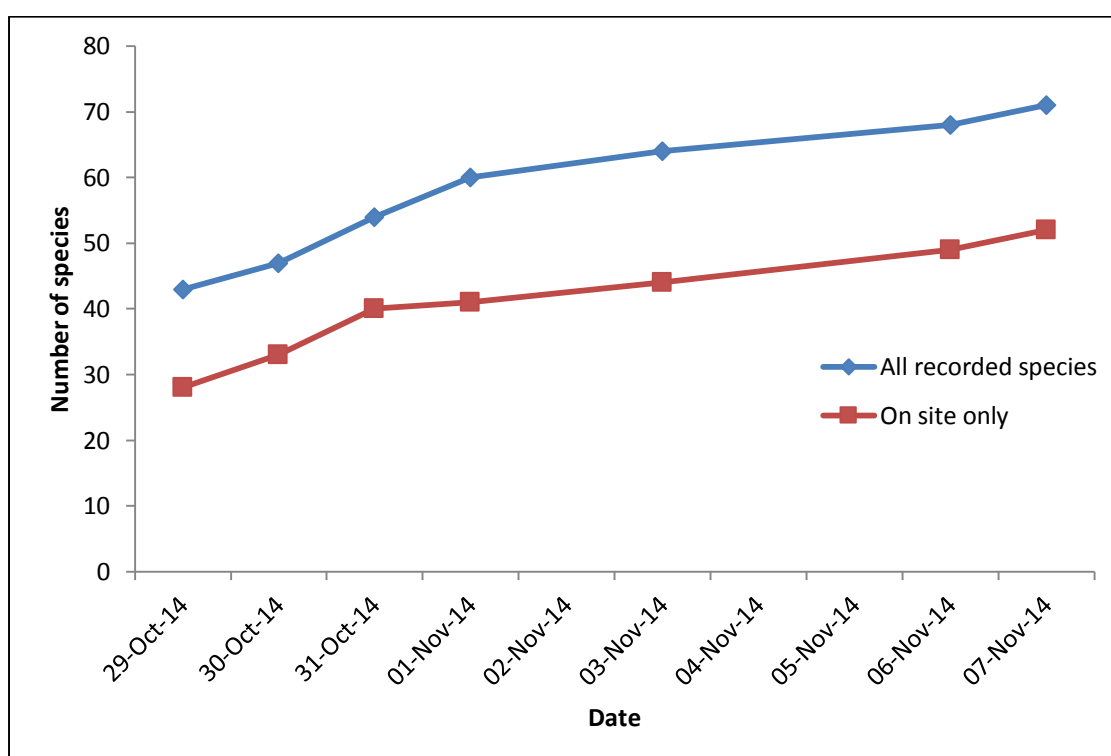


Figure 14. Species accumulation curve for 2014 sites where plantings were undertaken more than 10 years ago ('RevegOld' and 'Reveg02'). Counts have been tallied for survey days.

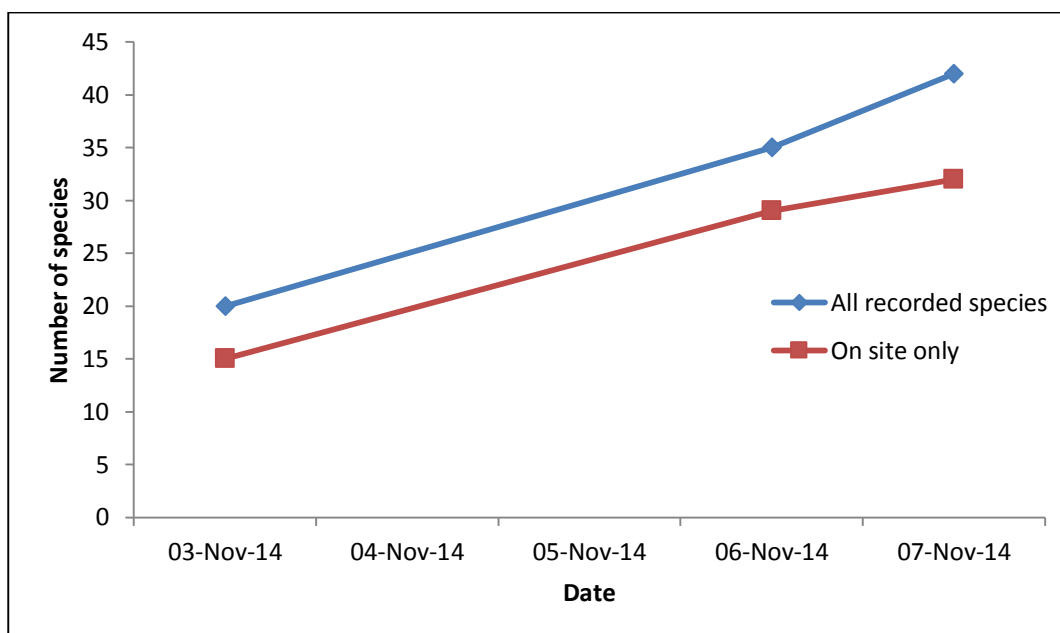


Figure 15. Species accumulation curve for 2014 sites where plantings were undertaken more than 5 years but less than 10 years ago (Reveg09). Counts have been tallied for survey days.

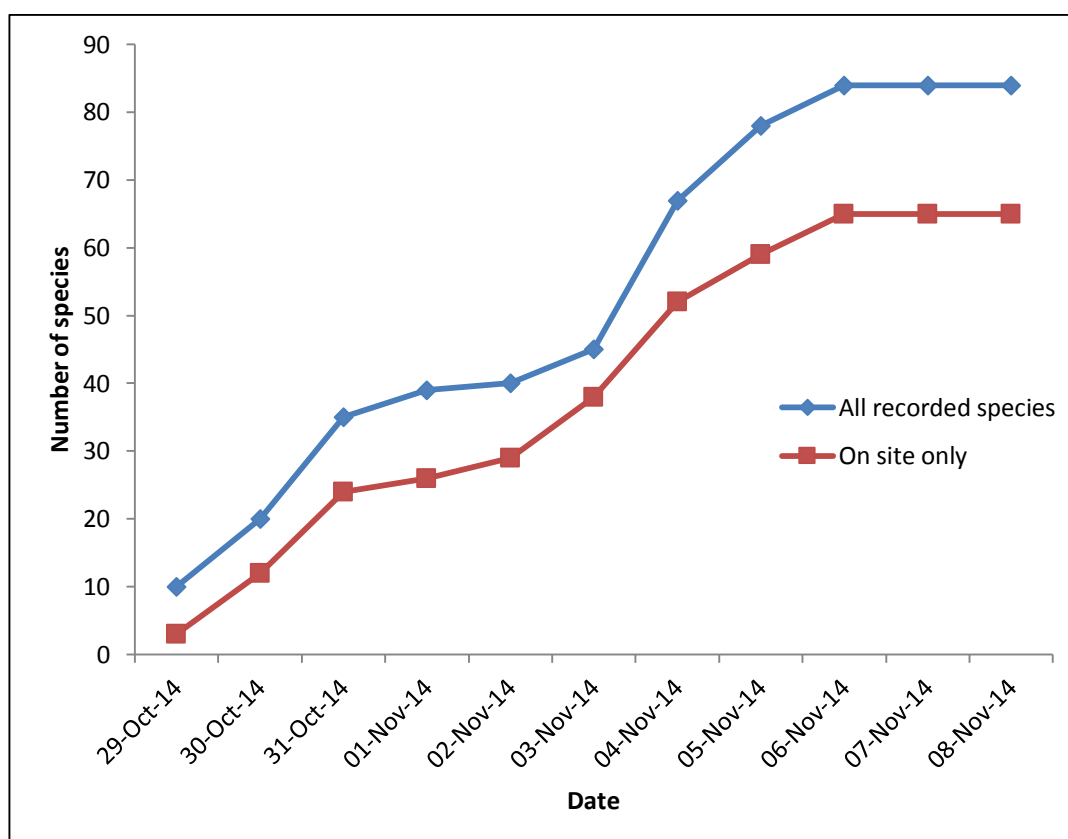


Figure 16. Species accumulation curve for 2014 sites where plantings were undertaken 2-4 years ago (Reveg10, Reveg11, Reveg12). Counts have been tallied for survey days.

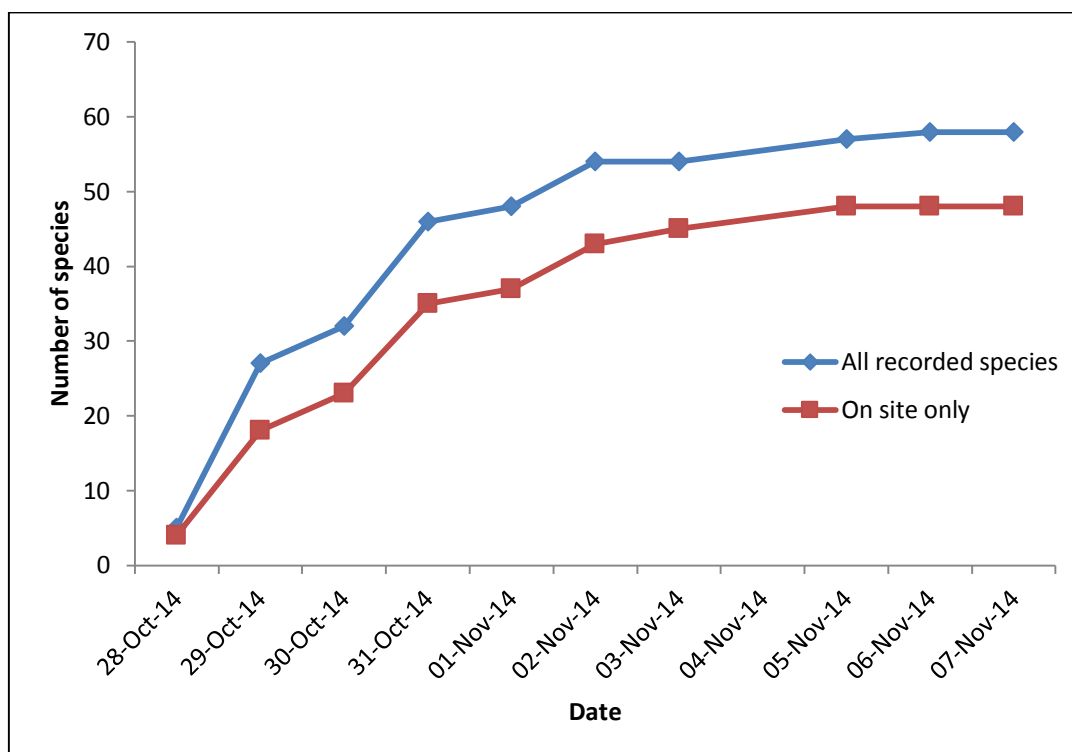


Figure 17. Species accumulation curve for sites where plantings occurred within one year of 2014 (Reveg13, Revveg14). Counts have been tallied for survey days.

Reporting rates of common species

Reporting rate for the 20 most common species across the survey and the 20 most common species for each of the revegetation age class is presented in Table 3 (see also Appendix 6 for number of records for each species for each site). The most common species for each revegetation age class are displayed in bold and colour coded. Some of the species overlap across the revegetation age classes, whilst others are more limited in their distribution – for example Golden Whistler (*Pachycephala pectoralis*) was one of the most frequently recorded species within remnant sites (reporting rate of 0.233), but was only recorded within two other revegetation age classes at lower reporting rates.

The species that are common in the remnant sites but not across the revegetation sites may provide good indicator species for the progression of these sites. These are shown in dark green and bold in Table 3 and are:

- Common Bronzewing;
- Golden Whistler;
- Rufous Whistler;
- Weebill;
- White-browed Babbler;
- Yellow Thornbill;
- Grey Shrike-thrush.



The table also shows how many revegetation age classes each species was recorded in. The ten species shaded in grey were the most “common” species encountered during the 2013 and 2014 surveys (see Appendix 7 for full list of species).

Some of the species were common across all of the ecosystem IDs (Appendix 8). There were also some, such as the Purple-gaped Honeyeater, Blue Bonnet and Variegated Fairy Wren, that had high reporting rates from one ecosystem ID but were absent or had low reporting rates from other ecosystem IDs.

Threatened species

Across the 2013 and 2014 surveys, 27 bird species were recorded that are listed under the South Australia *National Parks and Wildlife Act 1972* as endangered, vulnerable or rare. No federally listed species (*Environment Protection and Biodiversity Conservation Act 1999*) were recorded, though eight migratory species included in JAMBA, CAMBA or ROCAMBA listings were recorded. Table 4 lists these species and provides the reporting rate for each of the revegetation age class and the overall survey reporting rate.



Table 3. Reporting rates of “common” bird species (the twenty most common species overall are highlighted by grey shading).

Common name	Scientific name	Remnant	10+	5+	2-4	≤1	Overall reporting rate	Number of treatment types
Australian Magpie	<i>Cracticus tibicen</i>	0.533	0.722	1.000	0.481	0.542	0.541	5
Australian Pelican	<i>Pelecanus conspicillatus</i>	0.047	0.278	0.167	0.319	0.083	0.177	5
Australian Reed-Warbler	<i>Acrocephalus australis</i>	0.013	0.278		0.237		0.119	3
Australian Shelduck	<i>Tadorna tadornoides</i>	0.013	0.222		0.126	0.333	0.095	4
Australian White Ibis	<i>Threskiornis molucca</i>	0.047	0.222	0.167	0.311	0.250	0.183	5
Common Blackbird	<i>Turdus merula</i>	0.227	0.333	0.500	0.133	0.083	0.193	5
Common Bronzewing	<i>Phaps chalcoptera</i>	0.253	0.111	0.167	0.030		0.137	4
Common Starling	<i>Sturnus vulgaris</i>	0.347	0.444	0.167	0.452	0.292	0.392	5
Crested Pigeon	<i>Ocyphaps lophotes</i>	0.207	0.389	0.167	0.333	0.292	0.277	5
Eurasian Skylark	<i>Alauda arvensis</i>	0.093	0.056		0.415	0.750	0.271	4
Galah	<i>Eolophus roseicapillus</i>	0.453	0.167	0.500	0.400	0.250	0.408	5
Golden Whistler	<i>Pachycephala pectoralis</i>	0.233		0.167	0.030		0.121	3
Golden-headed Cisticola	<i>Cisticola exilis</i>	0.033	0.111	0.167	0.274	0.083	0.143	5
Great Cormorant	<i>Phalacrocorax carbo</i>	0.033	0.333	0.167	0.274	0.083	0.156	5
Grey Fantail	<i>Rhipidura albiscapa</i>	0.560	0.167	0.333	0.126		0.322	4
Grey Shrike-thrush	<i>Colluricincla harmonica</i>	0.620	0.111	0.167	0.067	0.042	0.321	5
House Sparrow	<i>Passer domesticus</i>	0.073	0.222		0.170	0.208	0.131	4
Little Grassbird	<i>Megalurus gramineus</i>	0.040	0.389	0.167	0.222	0.125	0.144	5
Little Raven	<i>Corvus mellori</i>	0.507	0.278	0.500	0.496	0.625	0.506	5
Magpie-lark	<i>Grallina cyanoleuca</i>	0.127	0.278	0.167	0.244	0.125	0.186	5
Nankeen Kestrel	<i>Falco cenchroides</i>	0.080	0.167	0.333	0.119	0.125	0.111	5
New Holland Honeyeater	<i>Phylidonyris novaehollandiae</i>	0.380	0.389	0.333	0.333	0.083	0.344	5
Peaceful Dove	<i>Geopelia placida</i>	0.307	0.333	0.333	0.037	0.042	0.183	5
Red Wattlebird	<i>Anthochaera carunculata</i>	0.427	0.389		0.156	0.125	0.289	4
Rufous Whistler	<i>Pachycephala rufiventris</i>	0.240	0.056	0.167	0.015		0.122	4
Silver Gull	<i>Chroicocephalus novaehollandiae</i>	0.080	0.167		0.133	0.208	0.116	4



Common name	Scientific name	Remnant	10+	5+	2-4	≤1	Overall reporting rate	Number of treatment types
Silvereye	<i>Zosterops lateralis</i>	0.507	0.167	0.500	0.207		0.334	4
Singing Honeyeater	<i>Lichenostomus virescens</i>	0.280	0.611	0.500	0.444	0.333	0.379	5
Spiny-cheeked Honeyeater	<i>Acanthagenys rufogularis</i>	0.487	0.222		0.126	0.250	0.304	4
Spotted Dove	<i>Stigmatopelia chinensis</i>	0.033	0.444	0.500	0.126	0.083	0.109	5
Straw-necked Ibis	<i>Threskiornis spinicollis</i>	0.087	0.167	0.333	0.244	0.208	0.171	5
Stubble Quail	<i>Coturnix pectoralis</i>	0.047	0.056		0.244	0.250	0.143	4
Superb Fairy-wren	<i>Malurus cyaneus</i>	0.747	0.556	0.500	0.385	0.292	0.560	5
Weebill	<i>Smicrornis brevirostris</i>	0.253	0.167		0.052		0.146	3
Welcome Swallow	<i>Hirundo neoxena</i>	0.180	0.444	0.500	0.489	0.333	0.342	5
Whiskered Tern	<i>Chlidonias hybrida</i>	0.020	0.444		0.393	0.542	0.235	4
Whistling Kite	<i>Haliastur sphenurus</i>	0.053	0.444	0.167	0.170	0.208	0.138	5
White-browed Babbler	<i>Pomatostomus superciliosus</i>	0.260	0.222		0.030		0.143	3
White-fronted Chat	<i>Epthianura albifrons</i>	0.093	0.056		0.126	0.292	0.119	4
Willie Wagtail	<i>Rhipidura leucophrys</i>	0.267	0.556	0.500	0.259	0.250	0.288	5
Yellow Thornbill	<i>Acanthiza nana</i>	0.367	0.056		0.037	0.042	0.188	4
Yellow-rumped Thornbill	<i>Acanthiza chrysorrhoa</i>	0.267	0.222		0.119	0.125	0.191	4

Table 4. Threatened and Conservation priority species recorded during the Coorong surveys.

Common name	Scientific name	Status	Remnant	10+	5+	2-4	≤1	Overall reporting rate	Number of treatment types	Ecosystem ID
Australasian Darter	<i>Anhinga novaehollandiae</i>	Rare				0.015		0.006	1	5
Banded Stilt	<i>Cladorhynchus leucocephalus</i>	Vulnerable				0.007		0.003	1	5
Black-chinned Honeyeater	<i>Melithreptus gularis</i>	Vulnerable	0.020					0.009	1	1
Brown Quail	<i>Coturnix ypsilophora</i>	Vulnerable	0.007	0.111	0.167	0.074		0.043	4	4, 5, 9, 10.4



Common name	Scientific name	Status	Remnant	10+	5+	2-4	≤1	Overall reporting rate	Number of treatment types	Ecosystem ID
Cape Barren Goose	<i>Cereopsis novaehollandiae</i>	Rare	0.007	0.111		0.044	0.042	0.031	4	3, 4, 5, 7, 9, 10.4
Caspian Tern	<i>Hydroprogne caspia</i>	CAMBA/JAMBA	0.007	0.222		0.141	0.042	0.076	4	1, 3, 4, 5, 7, 9
Chestnut Quail-thrush	<i>Cinclosoma castanotum</i>	Rare	0.020					0.009	1	6
Common Greenshank	<i>Tringa nebularia</i>	CAMBA/JAMBA/ROKAMBA	0.000	0.056				0.003	1	9
Crested Shrike-tit	<i>Falcunculus frontatus</i>	Rare	0.013					0.006	1	10.2
Crested Tern	<i>Thalasseus bergii</i>	JAMBA	0.007	0.111		0.059		0.034	3	1, 3, 5, 6.3, 9, 10.1
Curlew Sandpiper	<i>Calidris ferruginea</i>	CAMBA/JAMBA/ROKAMBA				0.007		0.003	1	5
Diamond Firetail	<i>Stagonopleura guttata</i>	Vulnerable	0.020			0.007		0.012	2	1
Great Egret	<i>Ardea alba</i>	CAMBA/JAMBA	0.027			0.037		0.027	2	5, 10.1
Elegant Parrot	<i>Neophema elegans</i>	Rare	0.193	0.056	0.167	0.111	0.208	0.155	5	1, 2, 3, 4, 5, 6.1, 6.2, 6.3, 6.4, 7, 9, 10.4
Flame Robin	<i>Petroica phoenicea</i>	Vulnerable	0.007					0.003	1	6
Great Crested Grebe	<i>Podiceps cristatus</i>	Rare	0.000	0.056		0.007		0.006	2	5, 9
Hooded Robin	<i>Melanodryas cucullata</i>	Rare	0.040					0.018	1	1, 9
Jacky Winter	<i>Microeca fascinans</i>	Rare	0.013					0.006	1	1
Latham's Snipe	<i>Gallinago hardwickii</i>	Rare/CAMBA/ JAMBA/ ROKAMBA	0.000					0.003	1	5
Little Lorikeet	<i>Glossopsitta pusilla</i>	Endangered	0.027					0.012	1	1, 6.4
Purple-gaped Honeyeater	<i>Lichenostomus cratitius</i>	Rare	0.080					0.036	1	4, 6.3



Common name	Scientific name	Status	Remnant	10+	5+	2-4	≤1	Overall reporting rate	Number of treatment types	Ecosystem ID
Rainbow Bee-eater	<i>Merops ornatus</i>	JAMBA	0.087					0.039	1	6.2, 9, 10.2
Red-chested Button-quail	<i>Turnix pyrrhothorax</i>	Rare	0.007					0.003	1	1
Shy Heathwren	<i>Hylacola cauta</i>	Rare	0.033					0.015	1	4, 6.3
Southern Emu-wren	<i>Stipiturus malachurus malachurus</i>	Rare	0.013			0.044		0.024	2	5, 9, 10.1
White-winged Black Tern	<i>Chlidonias leucopterus</i>	JAMBA	0.000			0.044	0.083	0.024	2	9, 10.4
Yellow-tailed Black-cockatoo	<i>Calyptorhynchus funereus</i>	Vulnerable	0.027			0.015		0.018	2	1, 2, 6.4



Discussion

The Department of Environment, Water and Natural Resources (DEWNR) has undertaken a long-term project to restore the ecological values of the Coorong, Lower Lakes and Murray Mouth (CLLMM). This project works with landholders and managers to revegetate the landscape. As a component of this project BirdLife Australia was contracted to collect baseline data on the bird species within the project region at a selection of pre-determined survey sites located within the CLLMM region. BirdLife undertook these surveys in 2013 and 2014 with different sites being surveyed in each year.

The Coorong National Park Management plan (DEP 1990) notes that 227 species of birds are known to occur within the region. Of these 85 species are water birds (DEH 2000). These were generally not separately surveyed during the current project, although many were recorded in adjacent habitats (sometimes within the 2 ha survey area) or flying over the survey sites. The 2014 surveys detected 134 species of birds in the survey area. These were predominately terrestrial species, however a range of waterbird species were also recorded.

In 2013 and 2014, surveys were undertaken in four different revegetation age groups and a fifth 'control' treatment consisting of remnant habitats. The sites were all different to those surveyed in 2013, and thus provided additional baseline data in the CLLMM region. Although the current surveys provide baseline data at multiple age revegetation sites, the overall results of the current surveys indicate that more replication is needed within the treatment groups and within the ecosystem types. Species accumulation curves indicate that the survey regime implemented in 2014 was insufficient for two of the treatment groups to detect the suite of bird species expected in the region. More effort (sites/days) would need to be spent to survey the '10+' and '5+' age classes.

It is likely that a few species known in the survey region have not been detected (for example any potential winter migrants to the area). In addition, the 2014 survey recorded 21 less species compared with the 2013 surveys. It is unclear what may have caused this. However there may be several reasons for this difference, which may require further investigation:

- **Timing** – the 2013 surveys extended until 16/11/13, whereas the 2014 surveys finished 8/11/14. It is possible that some migrants had not yet arrived in the CLLMM region. For example some woodswallow and cuckoo species were not recorded in 2014.
- **Rainfall** – Dry conditions in the CLLMM region were noted during the 2014 surveys. The region had low rainfalls over the winter and spring period (S. Jellinek pers. comm.), which may affect the timing and movements of a number of bird species.
- **Flowering** – Although not quantitatively measured during surveys, only a few sites were observed with any flowering trees. This may influence the presence of nectar-feeding species. A number of honeyeater species recorded in 2013 were not observed in 2014.
- **Site characteristics** – The 2014 sites were all different to those surveyed in 2013. It is possible that there are site specific characteristics (e.g.



proximity to water, nesting opportunities, shrub cover) that influence the presence of species.

Generally, the number of species recorded per survey in the remnant and sites revegetated more than 10 years ago was higher than in more recently revegetated sites. Intact sites should support and retain a greater range and abundance of species given the age of the remnant vegetation and structural diversity present in these sites. Woodland dependent species of conservation priority, except for Elegant Parrot and Brown Quail, were all recorded in remnant sites only.

It is generally expected that the older the revegetation, the higher the number of bird species that will be encountered within the site. This was generally the case for the revegetation sites, with older revegetation sites having a higher number of species than younger revegetation sites.

Replication of the treatment types was not equal across the ecosystem types, due to the number of sites available for surveying. This factor may also influence the patterns of observed species diversity as each ecosystem type is likely to support a different suite of species. It may therefore be more appropriate to compare species diversity between the treatment types for each ecosystem type, rather than combine the number of species for each treatment type. In addition, the methods of revegetation, species composition and structural diversity of some of the older revegetation treatments differ to the more recent plantings (S. Jellinek pers. comm.), which may also contribute to the differing species diversity between treatments.

The Southern Emu-wren, a species of conservation concern, was not recorded in the 2014 surveys although it was observed at three sites in 2013. This was despite using call playback to elicit a call response. It is unclear why this species was not present, although lack of cover and structure was noted at potentially suitable sites. It would be useful to survey known Southern Emu-wren sites from 2013 in the future, and to explore the differences in vegetation structure and landscape connectivity in more detail.

Twenty-seven threatened or priority bird species were recorded during the survey. These included waterbirds and woodland dependent species. Many of the waterbirds were recorded at multiple sites. Most of the woodland birds were only found in remnant vegetation and were not widespread or abundant. The Elegant Parrot however was found to be quite prolific across the landscape, in many of the ecosystem types, and had quite a high overall reporting rate of 0.155. This species was regularly encountered at remnant and revegetated sites of all ages and was observed feeding on seeds at site 573 (CLL569). Elegant Parrots were also the most variable in their habitat selection of the threatened species recorded. As seen in Table 4 this species was encountered in 12 of the 15 ecosystems.

The overall outcomes of these initial surveys conducted in 2013 and 2014 are to collect baseline data for the CLLMM project implemented by DEWNR, upon which further surveys and more detailed analyses can be based in the future. The results of these surveys show a diverse avian assemblage present across the landscape. Threatened species tend to be constrained in their distribution and are found predominately within remnant vegetation. The differences in the species diversity between remnant and restoration sites are also apparent (see figures 5-11). In



order to expand the study beyond baseline data collection and understand species diversity between treatments, and response of species to the revegetated sites, the following recommendations could be considered.

1. Increase survey effort for '10+' and '5+' revegetation age classes.
2. To understand year-to-year differences in overall species numbers (and potential effect of timing, rainfall, flowering intensity and site characteristics), future surveys should include a subset of sites from 2013 and 2014. It is recommended that these include sites in all 'Remnant', '10+' and '2-4' treatments (revegetation classes common to both 2013 and 2014 survey years), if possible. Sufficient replication should be undertaken to compare differences between years and treatments.
3. Each treatment type should be surveyed for 9-10 days. Both the 2013 and 2014 species accumulation curves for each treatment indicate that this is sufficient to capture species diversity.
4. To understand the unexpected lower species diversity at remnant sites compared with revegetated sites consideration should be given to:
 - a. removing wetland species from the summaries and analyses unless revegetation is specifically targeting restoration of habitat for wetland species;
 - b. comparing species diversity between the treatment types for each ecosystem type (rather than combining the ecosystem types across treatments, due to the presence of a different suite of species for each ecosystem). This may be difficult to do until there is sufficient replication within treatment types, however replicating sites in ecosystem types 5, 6.1 and 9 could provide such opportunities. Alternatively, a remnant, an older revegetation treatment (e.g. one of 'RevegOld', 'Reveg02' or 'Reveg09'), or a more recent revegetation treatment (one of 'Reveg10', 'Reveg11' or 'Reveg13') could be used to increase replication across ecosystem types.
5. To understand species response to revegetation, and how closely they resemble remnant sites in their bird species diversity and community composition. Further analyses could be focused on species that are likely to respond to the particular vegetation that is being replanted and restored. In addition, species diversity and landscape connectivity may also be looked at, as isolated revegetated sites are unlikely to be colonised as readily as those connected (or in closer proximity) to remnant sites.
6. Given that some of the revegetation sites are targeting the restoration of Southern Emu-wren habitat, sites where the species has previously been recorded (208, 475, 513 – surveyed in 2013) should be surveyed during each survey period in the future.
7. It would be useful to undertake a power analysis (or explore modelling species detectability) to determine if the current survey effort is adequate.



8. To understand the influence of revegetation on bird species distribution and to investigate if they have changed as a result of revegetation in the CLLMM region, an area of occupancy analysis should be considered.
9. To understand species community composition in the different ecosystems and between revegetated and remnant areas, community composition analysis (such as multidimensional scaling – MDS) should be considered.

References

BirdLife Australia (2014) Bird Assessment Surveys in the Coorong, Lower Lakes and Murray Mouth Region. Report prepared for the Department of the Environment, Water and Natural Resources.

DEH (2000) Coorong, and Lakes Alexandrina and Albert Ramsar Management Plan. Department of Environment and Heritage, Government of South Australia.

DEP (1990) Coorong National Park Management Plan. Department of Environment and Planning, SA.



Appendix 1 Waypoint site ID, vegetation, ecosystem ID and treatment of 2014 sites

Site ID	Vegetation	Ecosystem ID	Treatment
518	<i>Eucalyptus camaldulensis</i> var. <i>camaldulensis</i> grassy woodland	10.2	Remnant
520	Sheoak low woodland with shrubby understorey	5	Reveg09
521	Coastal Shrubland of the Coorong	3	Reveg09
522	Coastal Shrubland of the Coorong	3	Reveg02
523	Samphire (+/- <i>Melaleuca halmaturorum</i>) Shrubland Community	9	Reveg02
524	Non eucalypt grassy woodland (Sheoak/callitris)	10.4	Remnant
526	<i>Eucalyptus diversifolia</i> Mallee Communities of the South East (incl. <i>E. rugosa</i>)	4	Remnant
527	<i>Eucalyptus incrassata</i> / <i>E. leptophylla</i> +/- <i>E. socialis</i> Mallee Community (incl. <i>E. diversifolia</i>)	6.3	Remnant
528	<i>Eucalyptus diversifolia</i> Mallee Communities of the South East (incl. <i>B. ornata</i>)	4	Remnant
529	<i>Eucalyptus incrassata</i> / <i>E. leptophylla</i> +/- <i>E. socialis</i> Mallee Community (<i>M. helmats</i> / saline)	6.3	Remnant
530	Sheoak low woodland with shrubby understorey (<i>M. helmats</i> / samphire)	5	Remnant
532	<i>Eucalyptus porosa</i> (mallee box) Grassy Woodland	6.1	Remnant
533	Non eucalypt grassy woodland (Sheoak sand dune)	10.4	Remnant
534	Non eucalypt grassy woodland (<i>M. lanceolata</i> fresh)	10.4	Remnant
535	Sheoak low woodland with shrubby understorey (Sheoak Xanthorrhoea grassy woodland)	5	Remnant
536	Samphire (+/- <i>Melaleuca halmaturorum</i>) Shrubland Community	9	Remnant
537	Samphire (+/- <i>Melaleuca halmaturorum</i>) Shrubland Community	9	Remnant
538	Non eucalypt grassy woodland (modified sheoak and callitris)	10.4	Remnant
539	<i>Eucalyptus incrassata</i> / <i>E. leptophylla</i> +/- <i>E. socialis</i> Mallee Community (incl. <i>E. diversifolia</i>)	6.3	Remnant
541	<i>Eucalyptus porosa</i> (mallee box) Grassy Woodland	6.1	Reveg 12
542	Sheoak low woodland with shrubby understorey	5	Reveg13
544	Samphire (+/- <i>Melaleuca halmaturorum</i>) Shrubland Community	9	Remnant
545	<i>Eucalyptus porosa</i> (mallee box) Grassy Woodland	6.1	RevegOld
546	<i>Eucalyptus diversifolia</i> Mallee Communities of the South East	4	RevegOld
547	<i>Eucalyptus diversifolia</i> Mallee Communities of the South East	4	RevegOld
548	Samphire (+/- <i>Melaleuca halmaturorum</i>) Shrubland Community	9	RevegOld
549	Samphire (+/- <i>Melaleuca halmaturorum</i>) Shrubland Community	9	Reveg11
550	<i>Eucalyptus diversifolia</i> Mallee Communities of the South East	4	Reveg13
552	Non eucalypt grassy woodland	10.4	Reveg13
553	<i>Eucalyptus porosa</i> (mallee box) Grassy Woodland	6.1	Reveg13
554	<i>Eucalyptus diversifolia</i> Mallee Communities of the South East	4	Remnant
556	Freshwater fringing wetland community	7	Reveg11
557	Sheoak low woodland with shrubby understorey	5	Reveg11
558	Sheoak low woodland with shrubby understorey	5	Reveg11
559	Sheoak low woodland with shrubby understorey	5	Reveg10
560	Sheoak low woodland with shrubby understorey	5	Reveg10
561	Pink Gum (<i>Eucalyptus fasciculosa</i>) Low Open Grassy Woodland of the Mount Lofty Ranges	1	Reveg10
562	Pink Gum (<i>Eucalyptus fasciculosa</i>) Low Open Grassy Woodland of the Mount Lofty Ranges	1	Reveg10
563	<i>Eucalyptus incrassata</i> / <i>E. leptophylla</i> +/- <i>E. socialis</i> Mallee Community	6.3	Reveg11



Site ID	Vegetation	Ecosystem ID	Treatment
564	Sheoak low woodland with shrubby understorey	5	Reveg12
565	Gahnia filum sedgeland	10.1	Reveg12
566	Non eucalypt grassy woodland	10.4	Reveg14
567	<i>Eucalyptus porosa</i> (mallee box) Grassy Woodland	6.1	Remnant
569	Coastal Shrubland of the Coorong	3	Reveg13
570	Samphire (+/- <i>Melaleuca halmaturorum</i>) Shrubland Community	9	Reveg13
571	Samphire (+/- <i>Melaleuca halmaturorum</i>) Shrubland Community	9	Reveg11
572	Samphire (+/- <i>Melaleuca halmaturorum</i>) Shrubland Community	9	Reveg11
573	<i>Eucalyptus diversifolia</i> Mallee Communities of the South East	4	Reveg13
575	Peppermint Box (<i>Eucalyptus odorata</i>) Grassy Woodland (incl. <i>E. leucoxydon</i>)	6.2	Remnant



Appendix 2 Species list – birds

Birds			
'Adelaide Rosella'	Crested Tern	Little Wattlebird	Spiny-cheeked Honeyeater
Australasian Darter	Curlew Sandpiper	Long-billed Corella	Spotted Dove
Australasian Pipit	Elegant Parrot	Magpie-lark	Spotted Harrier
Australian Hobby	Emu	Masked Lapwing	Spotted Pardalote
Australian Magpie	Eurasian Coot	Masked Woodswallow	Straw-necked Ibis
Australian Pelican	Eurasian Skylark	Mulga Parrot	Striated Pardalote
Australian Raven	European Goldfinch	Musk Lorikeet	Striated Thornbill
Australian Reed-Warbler	Fairy Martin	Nankeen Kestrel	Stubble Quail
Australian Ringneck	Flame Robin	Nankeen Night-Heron	Superb Fairy-wren
Australian Shelduck	Galah	New Holland Honeyeater	Swamp Harrier
Australian White Ibis	Golden Whistler	Noisy Miner	Tawny-crowned Honeyeater
Banded Stilt	Golden-headed Cisticola	Pacific Black Duck	Tree Martin
Black Falcon	Great Cormorant	Peaceful Dove	Variegated Fairy-wren
Black Kite	Great Crested Grebe	Pied Butcherbird	Wedge-tailed Eagle
Black Swan	Great Egret	Pied Cormorant	Weebill
Black-faced Cuckoo-shrike	Grey Butcherbird	Pink-eared Duck	Welcome Swallow
Black-shouldered Kite	Grey Currawong	Purple Swamphen	Whiskered Tern
Black-winged Stilt	Grey Fantail	Purple-crowned Lorikeet	Whistling Kite
Blue Bonnet	Grey Shrike-thrush	Purple-gaped Honeyeater	White-backed Swallow
Brown Falcon	Grey Teal	Rainbow Bee-eater	White-browed Babbler
Brown Goshawk	Gull-billed Tern	Rainbow Lorikeet	White-browed Scrubwren
Brown Quail	Hooded Robin	Red Wattlebird	White-browed Woodswallow
Brown Songlark	Horsfield's Bronze-cuckoo	Red-capped Robin	White-faced Heron
Brown Thornbill	Horsfield's Bushlark	Red-kneed Dotterel	White-fronted Chat
Brush Bronzewing	House Sparrow	Red-necked Avocet	White-naped Honeyeater
Cape Barren Goose	Inland Thornbill	Red-rumped Parrot	White-necked Heron
Caspian Tern	Latham's Snipe	Rock Dove	White-plumed Honeyeater
Collared Sparrowhawk	Laughing Kookaburra	Royal Spoonbill	White-winged Black Tern
Common Blackbird	Little Black Cormorant	Rufous Whistler	Willie Wagtail
Common Bronzewing	Little Corella	Sharp-tailed Sandpiper	Yellow Thornbill
Common Greenshank	Little Eagle	Shining Bronze-Cuckoo	Yellow-faced Honeyeater
Common Starling	Little Grassbird	Silver Gull	Yellow-rumped Thornbill
Crested Bellbird	Little Pied Cormorant	Silvereye	
Crested Pigeon	Little Raven	Singing Honeyeater	



Appendix 3 Species list – mammals, frogs, reptiles

Mammals	Frogs	Reptiles
Rabbit (European Rabbit)	Banjo Frog	Sleepy Lizard
Brown Hare (European Hare)	Spotted Marsh Frog	Eastern Brown Snake
Brown Rat (Sewer Rat, Norway Rat)		
Cat (Feral Cat)		
Cattle (European Cattle)		
Dog (domestic or feral)		
Fox (Red Fox)		
House Mouse		
Kangaroo spp.		
Sheep (Feral Sheep)		
Western Grey Kangaroo		
Short-beaked Echidna		



Appendix 4 Bird species observed in one year and not the other

2013	2014
Australian Bustard	x
x	Australasian Darter
Australian Wood Duck	x
x	Banded Stilt
Black-chinned Honeyeater	x
Black-faced Woodswallow	x
Black-tailed Native-hen	x
Brown Treecreeper	x
Brown-headed Honeyeater	x
Budgerigar	x
Buff-rumped Thornbill	x
Chestnut Quail-thrush	x
Cockatiel	x
x	Common Greenshank
Crescent Honeyeater	x
x	Crested Bellbird
Crested Shrike-tit	x
x	Curlew Sandpiper
Dusky Woodswallow	x
Eastern Spinebill	x
Fan-tailed Cuckoo	x
x	Flame Robin
x	Great Crested Grebe
x	Gull-billed Tern
Hardhead	x
Jacky Winter	x
x	Latham's Snipe
Little Button-quail	x
Little Lorikeet	x
Mistletoebird	x
x	Mulga Parrot
x	Nankeen Night-Heron
x	Pied Butcherbird
x	Pink-eared Duck
Red-browed Finch	x
Red-chested Button-quail	x
x	Rock Dove
Rufous Songlark	x
Sacred Kingfisher	x
x	Sharp-tailed Sandpiper



2013	2014
Shy Heathwren	x
Southern Emu-wren	x
Southern Scrub-robin	x
Sulphur-crested Cockatoo	x
Varied Sitella	x
x	White-backed Swallow
White-winged Triller	x
Yellow-billed Spoonbill	x
Yellow-plumed Honeyeater	x
Yellow-tailed Black-Cockatoo	x
Zebra Finch	x



Appendix 5 Number of species recorded at each site in 2014 – remnant and 10+ (species highlighted recorded only in remnant sites)

Species/Site ID	Remnant																			10+					
	518	524	526	527	528	529	530	532	533	534	535	536	537	538	539	544	554	567	575	545	546	547	548	522	523
'Adelaide Rosella'	3																		2						
Australasian Darter																									
Australasian Pipit							2	1																	
Australian Hobby																									
Australian Magpie	2	2	2	1	1	2	3	1	1	1	1	1		3	3	2	1	2	2	2	2		3	3	3
Australian Pelican						1							2										3	1	1
Australian Raven						1									1										
Australian Reed-Warbler																					2				3
Australian Ringneck						1																			
Australian Shelduck													1	1							1		2		1
Australian White Ibis	1												2							1	1		2		
Banded Stilt																									
Black Falcon																									
Black Kite																									
Black Swan																							2		
Black-faced Cuckoo-shrike	1															1		2			1				
Black-shouldered Kite																							1		
Black-winged Stilt																							1		
Blue Bonnet							1							3											
Brown Falcon								1	1																
Brown Goshawk						1													2						
Brown Quail																					2				
Brown Songlark																									
Brown Thornbill																		2							
Brush Bronzewing				1			1		1	2	2						2								



Species/Site ID	Remnant																			10+					
	518	524	526	527	528	529	530	532	533	534	535	536	537	538	539	544	554	567	575	545	546	547	548	522	523
Cape Barren Goose																							1	1	
Caspian Tern																							3	1	
Collared Sparrowhawk																									
Common Blackbird						1	1												2	3		3			
Common Bronzewing		1		1		2			1	1						1			2	1	1				
Common Greenshank																							1		
Common Starling	3						2	2	1	1				1	1	2				1	1	1	3	1	1
Crested Bellbird				1																					
Crested Pigeon					1	2	2		2		1			2			1			3	1		1		2
Crested Tern													1										1		1
Curlew Sandpiper																									
Elegant Parrot					1		1			1			2	2			1		1						1
Emu						1									1										
Eurasian Coot																									
Eurasian Skylark									1				2				1							1	
European Goldfinch																3				1					
Fairy Martin																									
Flame Robin																		1							
Galah	2		2			1	1	3	2	2	2	3		1		1		1	3		1		1		1
Golden Whistler		1		2	1	1				2	1				2	3	2		1						
Golden-headed Cisticola													3											1	1
Great Cormorant	2										1												3	2	1
Great Crested Grebe																							1		
Great Egret																									
Grey Butcherbird				1	1	2	2	2	2	2	2				1		1								
Grey Currawong		1				1								1			1		2						
Grey Fantail		3	1			3	1	3	2	3	2	3			1	3	3		3	2	1				
Grey Shrike-thrush		2	3	2	3	3	2	2	2	2	3	1		1	2	1	3	1	2	2					
Grey Teal	2																						2		2



Species/Site ID	Remnant																				10+				
	518	524	526	527	528	529	530	532	533	534	535	536	537	538	539	544	554	567	575	545	546	547	548	522	523
Gull-billed Tern																									
Hooded Robin																1									
Horsfield's Bronze-cuckoo	1			1	2			1										1			1				
Horsfield's Bushlark							1													1				1	
House Sparrow							1							3						3			1		
Inland Thornbill								2			1				2										
Latham's Snipe																									
Laughing Kookaburra	1																								
Little Black Cormorant	1									1			1										1		1
Little Corella	2																			1	1				
Little Grassbird																					3			1	3
Little Pied Cormorant																									
Little Raven		1	1	1	2	3	2	1	1	1	2	3	2	3	3		1		3		2		1	2	
Little Wattlebird						2									1										
Long-billed Corella																									
Magpie-lark	2						2						1							1	1		1		2
Masked Lapwing													1												
Masked Woodswallow																1									
Mulga Parrot										1															
Musk Lorikeet	3																		2						
Nankeen Kestrel					1				3							1	1	1				1	1		1
Nankeen Night-Heron																									
New Holland Honeyeater				3	6	3	3								1	3			3	3	4				
Noisy Miner	3										1								1						
Pacific Black Duck																									2
Peaceful Dove		1	2				2	3	2	2	1			3		1	1			3	3				
Pied Butcherbird							1																		
Pied Cormorant	1																								
Pink-eared Duck																									



Species/Site ID	Remnant																			10+					
	518	524	526	527	528	529	530	532	533	534	535	536	537	538	539	544	554	567	575	545	546	547	548	522	523
Purple Swampphen																									1
Purple-crowned Lorikeet							1													1					
Purple-gaped Honeyeater						1									1										
Rainbow Bee-eater	2															1			1						
Rainbow Lorikeet																			2						
Red Wattlebird				3	2	3	2	1	1	1	1	2		2	3		1		3	3	2	1			1
Red-capped Robin																		2							
Red-kneled Dotterel																									
Red-necked Avocet																							1		
Red-rumped Parrot	3																		1						
Rock Dove																							1		
Royal Spoonbill	1																						1		
Rufous Whistler		1			1												1		2			1			
Sharp-tailed Sandpiper																							2		
Shining Bronze-Cuckoo							2				2						1								
Silver Gull												3									1		2		
Silvereye		2	3		2	3	2	3	1	1	1	1	3		2	3	3	1	1			2			1
Singing Honeyeater			2				4	1	1					3	1					1	1	3	2	1	3
Spiny-cheeked Honeyeater		2	3	3	3	2	3	3	3	3	3	1			3	3	3	1			1	3			
Spotted Dove								1												4	3				1
Spotted Harrier																		1							
Spotted Pardalote				2		2		2							1			3	3						
Straw-necked Ibis	1				1	1						1									1		1	1	
Striated Pardalote	3																								
Striated Thornbill																		1	3						
Stubble Quail																	1							1	
Superb Fairy-wren		3	1	1	3	2	3	1	3	3	3	3		1		2	1	2	3	3	3		2		2
Swamp Harrier								1	1														1	1	1
Tawny-crowned Honeyeater					1																				



Species/Site ID	Remnant																			10+					
	518	524	526	527	528	529	530	532	533	534	535	536	537	538	539	544	554	567	575	545	546	547	548	522	523
Tree Martin	3																			1					
Variegated Fairy-wren		2	3			2	1								1	1									
Wedge-tailed Eagle																									1
Weebill				1		2		2	1					1	1			3			3				
Welcome Swallow	2		2						1				1		1				1	3	3		1		1
Whiskered Tern													3										3	1	4
Whistling Kite	2																				2	2	3	1	
White-backed Swallow														1											
White-browed Babbler			1	1		1	2			1				2			1			1		3			
White-browed Scrubwren							1									1									
White-browed Woodswallow																1									
White-faced Heron	1											1											1		1
White-fronted Chat					1	2			1				3			2							1		
White-naped Honeyeater																			1						
White-necked Heron																									1
White-plumed Honeyeater	1													1					3	3	1				
White-winged Black Tern																									
Willie Wagtail	3					2	3		2	1						1	2		2	3	3		2	1	1
Yellow Thornbill		2	1	2		1		3	2	2	2	3			1	2	2					1			
Yellow-faced Honeyeater														1					1						
Yellow-rumped Thornbill		2	1			1		2		2	1					3		2		1	2		1		



Appendix 6 Number of records of each species at each site in 2014 – 5+, 2-4 and ≤1

Species/Site ID	5+		2-4														≤1							
	520	521	559	560	561	562	549	556	557	558	563	571	572	541	564	565	542	550	552	553	569	570	573	566
'Adelaide Rosella'					1																			
Australasian Darter				1						1														
Australasian Pipit			1		2								1	1		1						3		1
Australian Hobby				1																				
Australian Magpie	3	3	1	2	1	3		1		2			3		3	3	2	2	1	1		2	2	3
Australian Pelican	1		2	2	3	1		1	3	2		2	1	1		2						1	1	
Australian Raven																								
Australian Reed-Warbler				4	1	2		3		2			2		2	1								
Australian Ringneck																								
Australian Shelduck			1		1		2	2	2				1	1	1			2	1		1	3	1	
Australian White Ibis	1			2	1	2	2	3	1	1	1	3	1	1	1	2	3				2			1
Banded Stilt									1															
Black Falcon																	1							
Black Kite									1						1									
Black Swan			1	1	1	2			1	1		1												
Black-faced Cuckoo-shrike	1			2		2									2								1	
Black-shouldered Kite						1	3	1	1	1			2	2					1					1
Black-winged Stilt									1															
Blue Bonnet																								
Brown Falcon																								
Brown Goshawk																								
Brown Quail	1						1																	
Brown Songlark												1							1	1				
Brown Thornbill		1																						
Brush Bronzewing		3								2														
Cape Barren Goose								1	1									1						



	5+		2-4														≤1							
Species/Site ID	520	521	559	560	561	562	549	556	557	558	563	571	572	541	564	565	542	550	552	553	569	570	573	566
Caspian Tern			1		1		1	1	4	1		2	1								1			
Collared Sparrowhawk																							1	
Common Blackbird		3		2	1				1	2							2							
Common Bronzewing	1																							
Common Greenshank																								
Common Starling	1	1		3		3		3	1	2	3	2	1	1	4	2	3		1				1	2
Crested Bellbird																								
Crested Pigeon	1	1				3	1	1	2	3	3				3		2	3		1			1	
Crested Tern						1				1	1													
Curlew Sandpiper									1															
Elegant Parrot	1		1	1			2	1	1											1	1		3	
Emu																								
Eurasian Coot				2					1	2														
Eurasian Skylark			1		1		4		1			3	2	3					3	3	3	3	3	3
European Goldfinch		1		1										1			2							
Fairy Martin	1						1		2	1					1									
Flame Robin																								
Galah	3		2	2	2	3		3		3			1		2	2	3			1				1
Golden Whistler		1																						
Golden-headed Cisticola	1		1	1	2	3	3	3	2	2	2	1			2						1			1
Great Cormorant		1	3	2	3	3		1		2		1	1			3	1							1
Great Crested Grebe			1						1															
Great Egret										1						1								
Grey Butcherbird																								
Grey Currawong																							1	
Grey Fantail		2							1	1														
Grey Shrike-thrush		1																			1			
Grey Teal						1			1	1														
Gull-billed Tern																							1	



	5+		2-4														≤1							
Species/Site ID	520	521	559	560	561	562	549	556	557	558	563	571	572	541	564	565	542	550	552	553	569	570	573	566
Hooded Robin																								
Horsfield's Bronze-cuckoo		1																						
Horsfield's Bushlark	1																		1			2		
House Sparrow				2						1	2		1	1	2	1	3		2					
Inland Thornbill		1																						
Latham's Snipe										1														
Laughing Kookaburra																								
Little Black Cormorant							2		1	4											1			
Little Corella																								
Little Grassbird	1		1	2	1	3	1			2	1	1	1		2		1				2			1
Little Pied Cormorant									1															
Little Raven	1	2	3	3	3	3	1	3		2			2			1	1	1	3	2	1	3	1	2
Little Wattlebird				1																				
Long-billed Corella						2		2		1														
Magpie-lark	1		1	1					1	1	1	1	2	1	2	4	1	1						1
Masked Lapwing			3					1	1				2			1		1				1		
Masked Woodswallow																								
Mulga Parrot																								
Musk Lorikeet					3																			
Nankeen Kestrel		2	1	1							2		2	1	1	1							1	
Nankeen Night-Heron																	1							
New Holland Honeyeater	2			3	1				1	2				2	1		1						1	
Noisy Miner																	2	3						
Pacific Black Duck		1	2	1		1		3																
Peaceful Dove		2								1								1						
Pied Butcherbird																								
Pied Cormorant						1	1	1	2												1			
Pink-eared Duck									1															
Purple Swamphen					1	1																		



Species/Site ID	5+		2-4														≤1							
	520	521	559	560	561	562	549	556	557	558	563	571	572	541	564	565	542	550	552	553	569	570	573	566
Purple-crowned Lorikeet																								
Purple-gaped Honeyeater																								
Rainbow Bee-eater																								
Rainbow Lorikeet																								
Red Wattlebird				2						3					3		1						2	
Red-capped Robin																								
Red-kneed Dotterel									1															
Red-necked Avocet									1															
Red-rumped Parrot																	1							
Rock Dove													3											
Royal Spoonbill													1				1							
Rufous Whistler		1								1														
Sharp-tailed Sandpiper									1															
Shining Bronze-Cuckoo				1																				
Silver Gull			2	1		3		3	2	2		1			1		1				4			
Silvereye		3				2		1							3									
Singing Honeyeater	3		1		1	2			2	3	1		2	1	3			3				2	3	
Spiny-cheeked Honeyeater									1								2			2		1		
Spotted Dove	2	1		1				1	1					1	1		2							
Spotted Harrier												1				1								2
Spotted Pardalote																								
Straw-necked Ibis	2		3	1		1	2	1	1				1	3		2	1	2					1	1
Striated Pardalote																								
Striated Thornbill																								
Stubble Quail									1											1	2	1	1	2
Superb Fairy-wren		3		3	3	3	1	3			3				3		2				2			3
Swamp Harrier	1					2	1	1	1	2	1	2	2	1	1		1							1
Tawny-crowned Honeyeater																								
Tree Martin						1									1									



	5+		2-4														≤1							
Species/Site ID	520	521	559	560	561	562	549	556	557	558	563	571	572	541	564	565	542	550	552	553	569	570	573	566
Variegated Fairy-wren																								
Wedge-tailed Eagle																								
Weebill					3																			
Welcome Swallow	2	1		2	2	1			2	2	3		2	1	2	3	3	1	1		1		1	
Whiskered Tern			3	3	2	2	3	2	5	2		3	3	1		2	3		1	1	4	3		1
Whistling Kite	1			1					1	1	1	2	1	1	1	1		1	1		2			
White-backed Swallow																								
White-browed Babbler																								
White-browed Scrubwren		1																						
White-browed Woodswallow																								
White-faced Heron										1	1	1			2		1	1						
White-fronted Chat				1			1		2	1			1	1								1	3	3
White-naped Honeyeater																								
White-necked Heron																								
White-plumed Honeyeater	1			1																				
White-winged Black Tern												4										1		1
Willie Wagtail	2	1		3					2		2						3	1					2	
Yellow Thornbill				1	1										1								1	
Yellow-faced Honeyeater																								
Yellow-rumped Thornbill																	3							



Appendix 7 Reporting rates for all species from 2013 and 2014 surveys by revegetation age

Common name	Scientific name	Remnant	10+	5+	2-4	≤1	Overall reporting rate
'Adelaide Rosella'	<i>Platycercus elegans 'adelaidae'</i>	0.180	0.000	0.000	0.074	0.000	0.112
Australasian Darter	<i>Anhinga novaehollandiae</i>	0.000	0.000	0.000	0.015	0.000	0.006
Australasian Pipit	<i>Anthus novaeseelandiae</i>	0.027	0.000	0.000	0.170	0.167	0.094
Australian Hobby	<i>Falco longipennis</i>	0.000	0.000	0.000	0.022	0.000	0.009
Australian Magpie	<i>Cracticus tibicen</i>	0.533	0.722	1.000	0.481	0.542	0.541
Australian Pelican	<i>Pelecanus conspicillatus</i>	0.047	0.278	0.167	0.319	0.083	0.177
Australian Raven	<i>Corvus coronoides</i>	0.040	0.000	0.000	0.037	0.000	0.033
Australian Reed-Warbler	<i>Acrocephalus australis</i>	0.013	0.278	0.000	0.237	0.000	0.119
Australian Ringneck	<i>Barnardius zonarius</i>	0.040	0.000	0.000	0.000	0.000	0.018
Australian Shelduck	<i>Tadorna tadornoides</i>	0.013	0.222	0.000	0.126	0.333	0.095
Australian White Ibis	<i>Threskiornis molucca</i>	0.047	0.222	0.167	0.311	0.250	0.183
Australian Wood Duck	<i>Chenonetta jubata</i>	0.000	0.000	0.000	0.007	0.000	0.003
Banded Stilt	<i>Cladorhynchus leucocephalus</i>	0.000	0.000	0.000	0.007	0.000	0.003
Black Falcon	<i>Falco subniger</i>	0.007	0.000	0.000	0.000	0.042	0.006
Black Kite	<i>Milvus migrans</i>	0.053	0.000	0.000	0.015	0.000	0.030
Black Swan	<i>Cygnus atratus</i>	0.007	0.111	0.000	0.096	0.000	0.049
Black-chinned Honeyeater	<i>Melithreptus gularis</i>	0.020	0.000	0.000	0.000	0.000	0.009
Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>	0.060	0.056	0.167	0.089	0.042	0.073
Black-faced Woodswallow	<i>Artamus cinereus</i>	0.000	0.000	0.000	0.007	0.000	0.003
Black-shouldered Kite	<i>Elanus axillaris</i>	0.040	0.056	0.000	0.104	0.083	0.070
Black-tailed Native-hen	<i>Tribonyx ventralis</i>	0.040	0.000	0.000	0.059	0.000	0.042
Black-winged Stilt	<i>Himantopus himantopus</i>	0.000	0.056	0.000	0.022	0.000	0.012
Blue Bonnet	<i>Northiella haematogaster</i>	0.040	0.000	0.000	0.000	0.000	0.018
Brown Falcon	<i>Falco berigora</i>	0.027	0.000	0.000	0.030	0.000	0.024
Brown Goshawk	<i>Accipiter fasciatus</i>	0.053	0.000	0.000	0.000	0.000	0.024



Common name	Scientific name	Remnant	10+	5+	2-4	≤1	Overall reporting rate
Brown Quail	<i>Coturnix ypsilophora</i>	0.007	0.111	0.167	0.074	0.000	0.043
Brown Songlark	<i>Cincloramphus cruralis</i>	0.020	0.000	0.000	0.178	0.083	0.088
Brown Thornbill	<i>Acanthiza pusilla</i>	0.100	0.000	0.167	0.022	0.000	0.058
Brown Treecreeper	<i>Climacteris picumnus</i>	0.013	0.000	0.000	0.000	0.000	0.006
Brown-headed Honeyeater	<i>Melithreptus brevirostris</i>	0.073	0.000	0.000	0.022	0.000	0.042
Brush Bronzewing	<i>Phaps elegans</i>	0.087	0.000	0.167	0.015	0.000	0.049
Budgerigar	<i>Melopsittacus undulatus</i>	0.007	0.000	0.000	0.000	0.000	0.003
Buff-rumped Thornbill	<i>Acanthiza reguloides</i>	0.027	0.000	0.000	0.000	0.000	0.012
Cape Barren Goose	<i>Cereopsis novaehollandiae</i>	0.007	0.111	0.000	0.044	0.042	0.031
Caspian Tern	<i>Hydroprogne caspia</i>	0.007	0.222	0.000	0.141	0.042	0.076
Chestnut Quail-thrush	<i>Cinclosoma castanotum</i>	0.020	0.000	0.000	0.000	0.000	0.009
Cockatiel	<i>Nymphicus hollandicus</i>	0.013	0.000	0.000	0.000	0.000	0.006
Collared Sparrowhawk	<i>Accipiter cirrocephalus</i>	0.007	0.000	0.000	0.007	0.042	0.009
Common Blackbird	<i>Turdus merula</i>	0.227	0.333	0.500	0.133	0.083	0.193
Common Bronzewing	<i>Phaps chalcoptera</i>	0.253	0.111	0.167	0.030	0.000	0.137
Common Greenshank	<i>Tringa nebularia</i>	0.000	0.056	0.000	0.000	0.000	0.003
Common Starling	<i>Sturnus vulgaris</i>	0.347	0.444	0.167	0.452	0.292	0.392
Crescent Honeyeater	<i>Phylidonyris pyrrhopterus</i>	0.027	0.000	0.000	0.000	0.000	0.012
Crested Bellbird	<i>Oreoica gutturalis</i>	0.007	0.000	0.000	0.000	0.000	0.003
Crested Pigeon	<i>Ocyphaps lophotes</i>	0.207	0.389	0.167	0.333	0.292	0.277
Crested Shrike-tit	<i>Falcunculus frontatus</i>	0.013	0.000	0.000	0.000	0.000	0.006
Crested Tern	<i>Thalasseus bergii</i>	0.007	0.111	0.000	0.059	0.000	0.034
Curlew Sandpiper	<i>Calidris ferruginea</i>	0.000	0.000	0.000	0.007	0.000	0.003
Diamond Firetail	<i>Stagonopleura guttata</i>	0.020	0.000	0.000	0.007	0.000	0.012
Dusky Moorhen	<i>Gallinula tenebrosa</i>	0.007	0.000	0.000	0.000	0.000	0.003
Dusky Woodswallow	<i>Artamus cyanopterus</i>	0.060	0.000	0.000	0.007	0.000	0.030
Eastern Spinebill	<i>Acanthorhynchus tenuirostris</i>	0.020	0.000	0.000	0.000	0.000	0.009
Elegant Parrot	<i>Neophema elegans</i>	0.193	0.056	0.167	0.111	0.208	0.155
Emu	<i>Dromaius novaehollandiae</i>	0.013	0.000	0.000	0.015	0.000	0.012



Common name	Scientific name	Remnant	10+	5+	2-4	≤1	Overall reporting rate
Eurasian Coot	<i>Fulica atra</i>	0.000	0.000	0.000	0.059	0.000	0.024
Eurasian Skylark	<i>Alauda arvensis</i>	0.093	0.056	0.000	0.415	0.750	0.271
European Goldfinch	<i>Carduelis carduelis</i>	0.120	0.056	0.167	0.059	0.083	0.092
Fairy Martin	<i>Petrochelidon ariel</i>	0.007	0.000	0.167	0.059	0.000	0.031
Fan-tailed Cuckoo	<i>Cacomantis flabelliformis</i>	0.027	0.000	0.000	0.000	0.000	0.012
Flame Robin	<i>Petroica phoenicea</i>	0.007	0.000	0.000	0.000	0.000	0.003
Galah	<i>Eolophus roseicapillus</i>	0.453	0.167	0.500	0.400	0.250	0.408
Golden Whistler	<i>Pachycephala pectoralis</i>	0.233	0.000	0.167	0.030	0.000	0.121
Golden-headed Cisticola	<i>Cisticola exilis</i>	0.033	0.111	0.167	0.274	0.083	0.143
Great Cormorant	<i>Phalacrocorax carbo</i>	0.033	0.333	0.167	0.274	0.083	0.156
Great Crested Grebe	<i>Podiceps cristatus</i>	0.000	0.056	0.000	0.007	0.000	0.006
Great Egret	<i>Ardea alba</i>	0.027	0.000	0.000	0.037	0.000	0.027
Grey Butcherbird	<i>Cracticus torquatus</i>	0.213	0.000	0.000	0.007	0.000	0.100
Grey Currawong	<i>Strepera versicolor</i>	0.113	0.000	0.000	0.000	0.042	0.055
Grey Fantail	<i>Rhipidura albiscapa</i>	0.560	0.167	0.333	0.126	0.000	0.322
Grey Shrike-thrush	<i>Colluricincla harmonica</i>	0.620	0.111	0.167	0.067	0.042	0.321
Grey Teal	<i>Anas gracilis</i>	0.020	0.222	0.000	0.044	0.000	0.040
Gull-billed Tern	<i>Gelochelidon nilotica</i>	0.000	0.000	0.000	0.000	0.042	0.003
Hardhead	<i>Aythya australis</i>	0.000	0.000	0.000	0.015	0.000	0.006
Hooded Robin	<i>Melanodryas cucullata</i>	0.040	0.000	0.000	0.000	0.000	0.018
Horsfield's Bronze-cuckoo	<i>Chalcites basal</i>	0.173	0.056	0.167	0.037	0.000	0.100
Horsfield's Bushlark	<i>Mirafra javanica</i>	0.013	0.111	0.167	0.015	0.125	0.031
House Sparrow	<i>Passer domesticus</i>	0.073	0.222	0.000	0.170	0.208	0.131
Inland Thornbill	<i>Acanthiza apicalis</i>	0.053	0.000	0.167	0.000	0.000	0.028
Jacky Winter	<i>Microeca fascians</i>	0.013	0.000	0.000	0.000	0.000	0.006
Latham's Snipe	<i>Gallinago hardwickii</i>	0.000	0.000	0.000	0.007	0.000	0.003
Laughing Kookaburra	<i>Dacelo novaeguineae</i>	0.033	0.000	0.000	0.000	0.000	0.015
Little Black Cormorant	<i>Phalacrocorax sulcirostris</i>	0.020	0.111	0.000	0.059	0.042	0.043
Little Button-quail	<i>Turnix velox</i>	0.007	0.000	0.000	0.000	0.000	0.003



Common name	Scientific name	Remnant	10+	5+	2-4	≤1	Overall reporting rate
Little Corella	<i>Cacatua sanguinea</i>	0.047	0.111	0.000	0.007	0.000	0.031
Little Eagle	<i>Hieraaetus morphnoides</i>	0.020	0.000	0.000	0.000	0.000	0.009
Little Grassbird	<i>Megalurus gramineus</i>	0.040	0.389	0.167	0.222	0.125	0.144
Little Lorikeet	<i>Glossopsitta pusilla</i>	0.027	0.000	0.000	0.000	0.000	0.012
Little Pied Cormorant	<i>Microcarbo melanoleucos</i>	0.007	0.000	0.000	0.015	0.000	0.009
Little Raven	<i>Corvus mellori</i>	0.507	0.278	0.500	0.496	0.625	0.506
Little Wattlebird	<i>Anthochaera chrysoptera</i>	0.080	0.000	0.000	0.067	0.000	0.064
Long-billed Corella	<i>Cacatua tenuirostris</i>	0.007	0.000	0.000	0.044	0.000	0.021
Magpie-lark	<i>Grallina cyanoleuca</i>	0.127	0.278	0.167	0.244	0.125	0.186
Masked Lapwing	<i>Vanellus miles</i>	0.020	0.000	0.000	0.156	0.083	0.079
Masked Woodswallow	<i>Artamus personatus</i>	0.053	0.000	0.000	0.044	0.000	0.042
Mistletoebird	<i>Dicaeum hirundinaceum</i>	0.047	0.000	0.000	0.015	0.000	0.027
Mulga Parrot		0.007	0.000	0.000	0.000	0.000	0.003
Musk Lorikeet	<i>Glossopsitta concinna</i>	0.133	0.000	0.000	0.089	0.000	0.097
Nankeen Kestrel	<i>Falco cenchroides</i>	0.080	0.167	0.333	0.119	0.125	0.111
Nankeen Night-Heron	<i>Nyctcorax caledonicus</i>	0.000	0.000	0.000	0.000	0.042	0.003
New Holland Honeyeater	<i>Phylidonyris novaehollandiae</i>	0.380	0.389	0.333	0.333	0.083	0.344
Noisy Miner	<i>Manorina melanocephala</i>	0.060	0.000	0.000	0.000	0.208	0.043
Pacific Black Duck	<i>Anas superciliosa</i>	0.020	0.111	0.167	0.111	0.000	0.064
Peaceful Dove	<i>Geopelia placida</i>	0.307	0.333	0.333	0.037	0.042	0.183
Pied Butcherbird	<i>Cracticus nigrogularis</i>	0.007	0.000	0.000	0.000	0.000	0.003
Pied Cormorant	<i>Phalacrocorax varius</i>	0.007	0.000	0.000	0.104	0.042	0.049
Pink-eared Duck	<i>Malacorhynchus membranaceus</i>	0.000	0.000	0.000	0.007	0.000	0.003
Purple Swampphen	<i>Porphyrio porphyrio</i>	0.000	0.056	0.000	0.030	0.000	0.015
Purple-crowned Lorikeet	<i>Glossopsitta porphyrocephala</i>	0.027	0.056	0.000	0.000	0.000	0.015
Purple-gaped Honeyeater	<i>Lichenostomus cratitius</i>	0.080	0.000	0.000	0.000	0.000	0.036
Rainbow Bee-eater	<i>Merops ornatus</i>	0.087	0.000	0.000	0.000	0.000	0.039
Rainbow Lorikeet	<i>Trichoglossus haematodus</i>	0.067	0.000	0.000	0.104	0.000	0.073
Red Wattlebird	<i>Anthochaera carunculata</i>	0.427	0.389	0.000	0.156	0.125	0.289



Common name	Scientific name	Remnant	10+	5+	2-4	≤1	Overall reporting rate
Red-browed Firetail	<i>Neochmia temporalis</i>	0.020	0.000	0.000	0.022	0.000	0.018
Red-capped Robin	<i>Petroica goodenovii</i>	0.067	0.000	0.000	0.000	0.000	0.030
Red-chested Button-quail	<i>Turnix pyrrhotorax</i>	0.007	0.000	0.000	0.000	0.000	0.003
Red-kneed Dotterel	<i>Erythronyx cinctus</i>	0.000	0.000	0.000	0.015	0.000	0.006
Red-necked Avocet	<i>Recurvirostra novaehollandiae</i>	0.007	0.056	0.000	0.007	0.000	0.009
Red-rumped Parrot	<i>Psephotus haematonotus</i>	0.167	0.000	0.000	0.059	0.042	0.103
Rock Dove	<i>Columba livia</i>	0.000	0.056	0.000	0.022	0.000	0.012
Royal Spoonbill	<i>Platalea regia</i>	0.027	0.056	0.000	0.030	0.042	0.030
Rufous Songlark	<i>Cincloramphus mathewsi</i>	0.053	0.000	0.000	0.022	0.000	0.033
Rufous Whistler	<i>Pachycephala rufiventris</i>	0.240	0.056	0.167	0.015	0.000	0.122
Sacred Kingfisher	<i>Todiramphus sanctus</i>	0.007	0.000	0.000	0.000	0.000	0.003
Sharp-tailed Sandpiper	<i>Calidris acuminata</i>	0.000	0.111	0.000	0.007	0.000	0.009
Shining Bronze-Cuckoo	<i>Chalcites lucidus</i>	0.073	0.000	0.000	0.015	0.000	0.039
Shy Heathwren	<i>Hylacola cauta</i>	0.033	0.000	0.000	0.000	0.000	0.015
Silver Gull	<i>Chroicocephalus novaehollandiae</i>	0.080	0.167	0.000	0.133	0.208	0.116
Silvereye	<i>Zosterops lateralis</i>	0.507	0.167	0.500	0.207	0.000	0.334
Singing Honeyeater	<i>Lichenostomus virescens</i>	0.280	0.611	0.500	0.444	0.333	0.379
Southern Emu-wren	<i>Stipiturus malachurus malachurus</i>	0.013	0.000	0.000	0.044	0.000	0.024
Southern Scrub Robin	<i>Drymodes brunneopygia</i>	0.040	0.000	0.000	0.000	0.000	0.018
Spiny-cheeked Honeyeater	<i>Acanthagenys rufogularis</i>	0.487	0.222	0.000	0.126	0.250	0.304
Spotted Dove	<i>Stigmatopelia chinensis</i>	0.033	0.444	0.500	0.126	0.083	0.109
Spotted Harrier	<i>Circus assimilis</i>	0.047	0.000	0.000	0.081	0.083	0.061
Spotted Pardalote	<i>Pardalotus punctatus</i>	0.200	0.000	0.000	0.015	0.000	0.097
Straw-necked Ibis	<i>Threskiornis spinicollis</i>	0.087	0.167	0.333	0.244	0.208	0.171
Striated Pardalote	<i>Pardalotus striatus</i>	0.207	0.000	0.000	0.030	0.000	0.106
Striated Thornbill	<i>Acanthiza lineata</i>	0.080	0.000	0.000	0.007	0.000	0.039
Stubble Quail	<i>Coturnix pectoralis</i>	0.047	0.056	0.000	0.244	0.250	0.143
Sulphur-crested Cockatoo	<i>Cacatua galerita</i>	0.033	0.000	0.000	0.000	0.000	0.015



Common name	Scientific name	Remnant	10+	5+	2-4	≤1	Overall reporting rate
Superb Fairy-wren	<i>Malurus cyaneus</i>	0.747	0.556	0.500	0.385	0.292	0.560
Swamp Harrier	<i>Circus approximans</i>	0.020	0.167	0.167	0.185	0.083	0.104
Tawny-crowned Honeyeater	<i>Glyciphila melanops</i>	0.013	0.000	0.000	0.000	0.000	0.006
Tree Martin	<i>Petrochelidon nigricans</i>	0.087	0.056	0.000	0.052	0.000	0.064
Varied Sitella	<i>Daphoenositta chrysoptera</i>	0.013	0.000	0.000	0.000	0.000	0.006
Variegated Fairy-wren	<i>Malurus lamberti</i>	0.093	0.000	0.000	0.000	0.000	0.042
Wedge-tailed Eagle	<i>Aquila audax</i>	0.007	0.056	0.000	0.022	0.000	0.015
Weebill	<i>Smicrornis brevirostris</i>	0.253	0.167	0.000	0.052	0.000	0.146
Welcome Swallow	<i>Hirundo neoxena</i>	0.180	0.444	0.500	0.489	0.333	0.342
Whiskered Tern	<i>Chlidonias hybrida</i>	0.020	0.444	0.000	0.393	0.542	0.235
Whistling Kite	<i>Haliastur sphenurus</i>	0.053	0.444	0.167	0.170	0.208	0.138
White-backed Swallow	<i>Cheramoeca leucosterna</i>	0.007	0.000	0.000	0.000	0.000	0.003
White-browed Babbler	<i>Pomatostomus superciliosus</i>	0.260	0.222	0.000	0.030	0.000	0.143
White-browed Scrubwren	<i>Sericornis frontalis</i>	0.080	0.000	0.167	0.022	0.000	0.049
White-browed Woodswallow	<i>Artamus superciliosus</i>	0.160	0.000	0.000	0.096	0.000	0.112
White-faced Heron	<i>Egretta novaehollandiae</i>	0.033	0.111	0.000	0.059	0.083	0.052
White-fronted Chat	<i>Epthianura albifrons</i>	0.093	0.056	0.000	0.126	0.292	0.119
White-fronted Honeyeater	<i>Purnella albifrons</i>	0.020	0.000	0.000	0.000	0.000	0.009
White-naped Honeyeater	<i>Melithreptus lunatus</i>	0.007	0.000	0.000	0.000	0.000	0.003
White-necked Heron	<i>Ardea pacifica</i>	0.013	0.056	0.000	0.000	0.000	0.009
White-plumed Honeyeater	<i>Lichenostomus penicillatus</i>	0.133	0.222	0.167	0.133	0.000	0.131
White-winged Black Tern	<i>Chlidonias leucopterus</i>	0.000	0.000	0.000	0.044	0.083	0.024
White-winged Triller	<i>Lalage sueurii</i>	0.053	0.000	0.000	0.022	0.000	0.033
Willie Wagtail	<i>Rhipidura leucophrys</i>	0.267	0.556	0.500	0.259	0.250	0.288
Yellow Thornbill	<i>Acanthiza nana</i>	0.367	0.056	0.000	0.037	0.042	0.188
Yellow-billed Spoonbill	<i>Platalea flavipes</i>	0.007	0.000	0.000	0.000	0.000	0.003
Yellow-faced Honeyeater	<i>Lichenostomus chrysops</i>	0.027	0.000	0.000	0.000	0.000	0.012
Yellow-plumed Honeyeater	<i>Lichenostomus ornatus</i>	0.020	0.000	0.000	0.000	0.000	0.009



Common name	Scientific name	Remnant	10+	5+	2-4	≤1	Overall reporting rate
Yellow-rumped Thornbill	<i>Acanthiza chrysorrhoa</i>	0.267	0.222	0.000	0.119	0.125	0.191
Yellow-tailed Black-cockatoo	<i>Calyptorhynchus funereus</i>	0.027	0.000	0.000	0.015	0.000	0.018
Zebra Finch	<i>Taeniopygia guttata</i>	0.007	0.000	0.000	0.000	0.000	0.003



Appendix 8 Reporting rates for all species from 2013 and 2014 surveys by ecosystem ID

Bold, coloured fields indicate 20 species with highest reporting rate for each ecosystem ID, grey shading indicates 20 species with highest reporting rate across all 15 ecosystem IDs.

Common name	1	2	3	4	5	6.1	6.2	6.3	6.4	7.0	9.0	10.1	10.2	10.3	10.4	Overall reporting rate	Number of ecosystems
'Adelaide Rosella'	0.444	0.500	0.154	0.026	0.035	0.000	0.833	0.000	1.000	0.000	0.000	0.000	0.667	0.000	0.000	0.129	8
Australasian Darter	0.000	0.000	0.000	0.000	0.035	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	1
Australasian Pipit	0.111	0.000	0.000	0.051	0.123	0.095	0.000	0.000	0.000	0.000	0.125	0.167	0.000	0.000	0.083	0.075	7
Australian Hobby	0.028	0.000	0.000	0.000	0.035	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	2
Australian Magpie	0.639	0.333	0.538	0.462	0.649	0.381	0.833	0.476	0.833	0.333	0.417	0.667	0.667	0.333	0.500	0.532	15
Australian Pelican	0.139	0.000	0.179	0.051	0.298	0.095	0.000	0.048	0.000	0.333	0.354	0.667	0.000	0.000	0.056	0.174	10
Australian Raven	0.056	0.000	0.026	0.077	0.018	0.000	0.000	0.095	0.000	0.000	0.000	0.333	0.000	0.333	0.028	0.039	8
Australian Reed-Warbler	0.083	0.000	0.051	0.051	0.281	0.000	0.000	0.000	0.000	1.000	0.229	0.000	0.000	0.000	0.000	0.111	6
Australian Ringneck	0.139	0.000	0.000	0.000	0.000	0.000	0.000	0.095	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.021	2
Australian Shelduck	0.000	0.000	0.051	0.103	0.088	0.048	0.000	0.000	0.000	0.667	0.271	0.167	0.000	0.000	0.083	0.093	8
Australian White Ibis	0.167	0.000	0.231	0.051	0.281	0.095	0.000	0.048	0.000	1.000	0.292	0.500	0.167	0.000	0.083	0.180	11
Australian Wood Duck	0.000	0.000	0.000	0.000	0.018	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	1
Banded Stilt	0.000	0.000	0.000	0.000	0.018	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	1
Black Falcon	0.000	0.000	0.000	0.000	0.018	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.167	0.000	0.000	0.006	2
Black Kite	0.000	0.000	0.000	0.000	0.035	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.222	0.030	2
Black Swan	0.111	0.000	0.077	0.000	0.088	0.000	0.000	0.000	0.000	0.000	0.083	0.000	0.000	0.000	0.000	0.048	4
Black-chinned Honeyeater	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	1
Black-faced Cuckoo-shrike	0.139	0.000	0.000	0.051	0.123	0.095	0.000	0.048	0.000	0.000	0.021	0.333	0.500	0.000	0.028	0.072	9
Black-faced Woodswallow	0.000	0.000	0.000	0.026	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	1
Black-shouldered Kite	0.028	0.000	0.000	0.026	0.070	0.190	0.000	0.000	0.000	0.333	0.125	0.000	0.000	0.333	0.139	0.069	8
Black-tailed Native-hen	0.000	0.000	0.128	0.000	0.035	0.000	0.000	0.000	0.000	0.000	0.063	0.000	0.500	0.000	0.028	0.042	5
Black-winged Stilt	0.000	0.000	0.026	0.000	0.018	0.000	0.000	0.000	0.000	0.000	0.042	0.000	0.000	0.000	0.000	0.012	3
Blue Bonnet	0.000	0.000	0.000	0.000	0.018	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.333	0.111	0.018	3



Common name	1	2	3	4	5	6.1	6.2	6.3	6.4	7.0	9.0	10.1	10.2	10.3	10.4	Overall reporting rate	Number of ecosystems
Brown Falcon	0.083	0.000	0.000	0.026	0.000	0.095	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.333	0.000	0.021	4
Brown Goshawk	0.000	0.000	0.000	0.026	0.000	0.000	0.333	0.095	0.000	0.000	0.000	0.000	0.167	0.000	0.000	0.018	4
Brown Quail	0.000	0.000	0.128	0.077	0.053	0.000	0.000	0.000	0.000	0.000	0.042	0.000	0.000	0.000	0.028	0.042	5
Brown Songlark	0.028	0.000	0.359	0.051	0.105	0.048	0.000	0.000	0.000	0.000	0.021	0.000	0.000	1.000	0.028	0.087	8
Brown Thornbill	0.083	0.333	0.077	0.077	0.000	0.095	0.000	0.000	0.000	0.000	0.063	0.000	0.000	0.000	0.083	0.057	7
Brown Treecreeper	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.333	0.000	0.000	0.000	0.000	0.000	0.000	0.006	1
Brown-headed Honeyeater	0.194	0.000	0.000	0.051	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.167	0.000	0.000	0.111	0.042	4
Brush Bronzewing	0.000	0.000	0.077	0.103	0.105	0.000	0.000	0.048	0.000	0.000	0.021	0.000	0.000	0.000	0.083	0.054	6
Budgerigar	0.000	0.000	0.000	0.026	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	1
Buff-rumped Thornbill	0.000	0.000	0.000	0.026	0.000	0.000	0.000	0.000	0.333	0.000	0.000	0.000	0.000	0.000	0.028	0.012	3
Cape Barren Goose	0.000	0.000	0.051	0.026	0.035	0.000	0.000	0.000	0.000	0.333	0.042	0.000	0.000	0.000	0.056	0.030	6
Caspian Tern	0.028	0.000	0.128	0.026	0.123	0.000	0.000	0.000	0.000	0.333	0.208	0.000	0.000	0.000	0.000	0.075	6
Chestnut Quail-thrush	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.143	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	1
Cockatiel	0.056	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	1
Collared Sparrowhawk	0.000	0.000	0.026	0.026	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.167	0.000	0.000	0.009	3
Common Blackbird	0.222	0.833	0.205	0.205	0.263	0.143	0.333	0.143	0.500	0.000	0.104	0.000	0.167	0.000	0.056	0.189	12
Common Bronzewing	0.250	0.500	0.051	0.154	0.070	0.095	0.333	0.286	0.333	0.000	0.063	0.000	0.000	0.000	0.167	0.135	11
Common Greenshank	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.000	0.000	0.000	0.000	0.003	1
Common Starling	0.556	0.667	0.231	0.205	0.561	0.333	0.000	0.333	0.333	1.000	0.417	0.333	0.833	0.000	0.306	0.390	13
Crescent Honeyeater	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.167	0.000	0.000	0.000	0.000	0.000	0.000	0.012	2
Crested Bellbird	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.048	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	1
Crested Pigeon	0.278	0.000	0.205	0.205	0.439	0.333	0.333	0.286	0.167	0.333	0.188	0.000	0.167	0.000	0.389	0.276	12
Crested Shrike-tit	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.333	0.000	0.000	0.006	1
Crested Tern	0.028	0.000	0.051	0.000	0.035	0.000	0.000	0.048	0.000	0.000	0.083	0.167	0.000	0.000	0.000	0.033	6
Curlew Sandpiper	0.000	0.000	0.000	0.000	0.018	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	1
Diamond Firetail	0.111	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012	1



Common name	1	2	3	4	5	6.1	6.2	6.3	6.4	7.0	9.0	10.1	10.2	10.3	10.4	Overall reporting rate	Number of ecosystems
Dusky Moorhen	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.167	0.000	0.000	0.003	1
Dusky Woodswallow	0.278	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.030	1
Eastern Spinebill	0.056	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.167	0.000	0.000	0.000	0.000	0.000	0.000	0.009	2
Elegant Parrot	0.194	0.333	0.154	0.231	0.088	0.048	0.167	0.143	0.500	0.333	0.188	0.000	0.000	0.000	0.111	0.153	12
Emu	0.000	0.000	0.000	0.051	0.000	0.000	0.000	0.095	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012	2
Eurasian Coot	0.028	0.000	0.000	0.000	0.123	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.024	2
Eurasian Skylark	0.083	0.000	0.615	0.128	0.246	0.429	0.000	0.000	0.000	0.000	0.500	0.000	0.000	1.000	0.194	0.267	8
European Goldfinch	0.083	0.667	0.026	0.026	0.105	0.143	0.000	0.048	0.167	0.000	0.104	0.167	0.167	0.000	0.083	0.090	12
Fairy Martin	0.028	0.000	0.051	0.000	0.088	0.000	0.000	0.000	0.000	0.000	0.021	0.000	0.167	0.000	0.000	0.030	5
Fan-tailed Cuckoo	0.056	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.333	0.000	0.000	0.000	0.000	0.000	0.000	0.012	2
Flame Robin	0.000	0.000	0.000	0.000	0.000	0.048	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	1
Galah	0.694	0.500	0.205	0.256	0.474	0.476	1.000	0.190	0.833	1.000	0.208	0.333	0.833	0.000	0.444	0.402	14
Golden Whistler	0.222	0.167	0.077	0.205	0.035	0.048	0.167	0.238	0.333	0.104	0.000	0.000	0.000	0.000	0.111	0.120	11
Golden-headed Cisticola	0.194	0.000	0.051	0.026	0.228	0.000	0.000	0.095	0.000	1.000	0.292	0.500	0.000	0.000	0.056	0.141	9
Great Cormorant	0.194	0.000	0.231	0.000	0.228	0.048	0.000	0.000	0.000	0.333	0.229	0.667	0.333	0.000	0.083	0.153	9
Great Crested Grebe	0.000	0.000	0.000	0.000	0.018	0.000	0.000	0.000	0.000	0.000	0.021	0.000	0.000	0.000	0.000	0.006	2
Great Egret	0.000	0.000	0.000	0.000	0.070	0.000	0.000	0.000	0.000	0.000	0.042	0.167	0.333	0.000	0.000	0.027	4
Grey Butcherbird	0.083	0.000	0.026	0.231	0.105	0.095	0.000	0.333	0.000	0.000	0.000	0.000	0.000	0.000	0.139	0.099	7
Grey Currawong	0.000	0.500	0.000	0.128	0.000	0.000	0.333	0.238	0.000	0.000	0.021	0.000	0.000	0.000	0.056	0.054	6
Grey Fantail	0.389	0.667	0.256	0.410	0.211	0.333	0.833	0.190	1.000	0.000	0.208	0.000	0.000	0.000	0.500	0.318	11
Grey Shrike-thrush	0.417	0.500	0.154	0.538	0.158	0.238	0.500	0.714	0.667	0.000	0.125	0.167	0.167	0.000	0.472	0.318	13
Grey Teal	0.028	0.000	0.000	0.000	0.070	0.000	0.000	0.000	0.000	0.000	0.104	0.000	0.500	0.000	0.000	0.039	4
Gull-billed Tern	0.000	0.000	0.000	0.026	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	1
Hardhead	0.000	0.000	0.000	0.000	0.018	0.000	0.000	0.000	0.000	0.000	0.021	0.000	0.000	0.000	0.000	0.006	2
Hooded Robin	0.139	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.000	0.000	0.000	0.000	0.018	2
Horsfield's Bronze-cuckoo	0.278	0.000	0.051	0.128	0.000	0.095	0.167	0.095	0.500	0.000	0.021	0.167	0.167	0.000	0.139	0.099	11
Horsfield's Bushlark	0.000	0.000	0.026	0.000	0.070	0.048	0.000	0.000	0.000	0.000	0.042	0.000	0.000	0.333	0.028	0.030	6
House Sparrow	0.000	0.500	0.128	0.026	0.281	0.190	0.000	0.143	0.000	0.000	0.063	0.167	0.000	0.000	0.194	0.129	9



Common name	1	2	3	4	5	6.1	6.2	6.3	6.4	7.0	9.0	10.1	10.2	10.3	10.4	Overall reporting rate	Number of ecosystems
Inland Thornbill	0.000	0.000	0.026	0.077	0.018	0.095	0.000	0.095	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.027	5
Jacky Winter	0.056	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	1
Latham's Snipe	0.000	0.000	0.000	0.000	0.018	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	1
Laughing Kookaburra	0.028	0.167	0.000	0.000	0.000	0.000	0.167	0.000	0.167	0.000	0.000	0.000	0.167	0.000	0.000	0.015	5
Little Black Cormorant	0.139	0.000	0.051	0.000	0.088	0.000	0.000	0.000	0.000	0.000	0.104	0.000	0.167	0.000	0.028	0.057	6
Little Button-quail	0.000	0.000	0.000	0.026	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	1
Little Corella	0.000	0.000	0.000	0.026	0.000	0.048	0.333	0.000	0.500	0.000	0.000	0.167	0.333	0.000	0.000	0.030	6
Little Eagle	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.167	0.000	0.056	0.009	2
Little Grassbird	0.000	0.000	0.077	0.103	0.263	0.000	0.000	0.048	0.000	0.000	0.313	0.500	0.167	0.000	0.028	0.129	8
Little Lorikeet	0.056	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.333	0.000	0.000	0.000	0.000	0.000	0.000	0.012	2
Little Pied Cormorant	0.028	0.000	0.000	0.000	0.018	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.167	0.000	0.000	0.009	3
Little Raven	0.556	0.833	0.487	0.487	0.579	0.381	0.833	0.476	0.333	1.000	0.354	0.500	0.167	0.000	0.583	0.498	14
Little Wattlebird	0.139	0.167	0.077	0.077	0.070	0.000	0.000	0.143	0.000	0.000	0.021	0.167	0.000	0.000	0.000	0.063	8
Long-billed Corella	0.083	0.167	0.000	0.000	0.018	0.000	0.000	0.000	0.000	0.667	0.000	0.000	0.000	0.000	0.000	0.021	4
Magpie-lark	0.111	0.000	0.077	0.103	0.281	0.333	0.333	0.095	0.333	0.000	0.271	0.667	0.500	0.000	0.028	0.183	12
Masked Lapwing	0.000	0.000	0.128	0.026	0.123	0.000	0.000	0.000	0.000	0.333	0.167	0.167	0.000	0.000	0.083	0.078	7
Masked Woodswallow	0.083	0.000	0.026	0.051	0.070	0.000	0.000	0.048	0.000	0.000	0.021	0.000	0.000	0.000	0.056	0.042	7
Mistletoebird	0.139	0.667	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.027	2
Mulga Parrot	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.028	0.003	1
Musk Lorikeet	0.306	0.333	0.077	0.000	0.053	0.000	0.500	0.048	0.833	0.000	0.000	0.167	0.500	0.000	0.000	0.096	9
Nankeen Kestrel	0.000	0.167	0.077	0.154	0.105	0.286	0.167	0.095	0.167	0.000	0.104	0.167	0.000	0.000	0.111	0.108	11
Nankeen Night-Heron	0.000	0.000	0.000	0.000	0.018	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	1
New Holland Honeyeater	0.361	0.833	0.359	0.410	0.404	0.333	0.833	0.381	0.833	0.000	0.208	0.000	0.167	0.000	0.167	0.339	12
Noisy Miner	0.028	0.000	0.000	0.103	0.053	0.000	0.167	0.000	0.000	0.000	0.000	0.000	0.833	0.000	0.000	0.042	5
Pacific Black Duck	0.028	0.000	0.103	0.000	0.105	0.000	0.000	0.000	0.000	1.000	0.083	0.000	0.500	0.000	0.000	0.063	6
Peaceful Dove	0.194	0.000	0.154	0.308	0.105	0.286	0.000	0.048	0.000	0.000	0.063	0.000	0.167	0.000	0.500	0.180	9
Pied Butcherbird	0.000	0.000	0.000	0.000	0.018	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	1
Pied Cormorant	0.028	0.000	0.128	0.000	0.088	0.000	0.000	0.000	0.000	0.333	0.021	0.333	0.167	0.000	0.000	0.048	7



Common name	1	2	3	4	5	6.1	6.2	6.3	6.4	7.0	9.0	10.1	10.2	10.3	10.4	Overall reporting rate	Number of ecosystems
Pink-eared Duck	0.000	0.000	0.000	0.000	0.018	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	1
Purple Swampphen	0.083	0.000	0.000	0.000	0.018	0.000	0.000	0.000	0.000	0.000	0.021	0.000	0.000	0.000	0.000	0.015	3
Purple-crowned Lorikeet	0.000	0.333	0.000	0.000	0.070	0.048	0.000	0.000	0.167	0.000	0.000	0.000	0.000	0.000	0.000	0.024	4
Purple-gaped Honeyeater	0.000	0.000	0.000	0.103	0.000	0.000	0.000	0.381	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.036	2
Rainbow Bee-eater	0.028	0.000	0.000	0.000	0.000	0.000	0.167	0.000	0.000	0.000	0.021	0.000	0.333	0.000	0.222	0.039	5
Rainbow Lorikeet	0.139	0.000	0.154	0.026	0.000	0.000	0.333	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.083	0.060	6
Red Wattlebird	0.194	0.167	0.103	0.487	0.351	0.238	1.000	0.619	0.833	0.000	0.167	0.167	0.167	0.000	0.139	0.285	13
Red-browed Firetail	0.000	0.167	0.000	0.000	0.018	0.095	0.000	0.000	0.333	0.000	0.000	0.000	0.000	0.000	0.000	0.018	4
Red-capped Robin	0.028	0.000	0.000	0.026	0.000	0.095	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.167	0.030	4
Red-chested Button-quail	0.028	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	1
Red-kneed Dotterel	0.000	0.000	0.000	0.000	0.035	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	1
Red-necked Avocet	0.000	0.000	0.000	0.000	0.018	0.000	0.000	0.000	0.000	0.000	0.042	0.000	0.000	0.000	0.000	0.009	2
Red-rumped Parrot	0.528	0.167	0.000	0.000	0.018	0.000	0.333	0.000	0.833	0.000	0.000	0.000	0.500	0.000	0.056	0.099	7
Rock Dove	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.083	0.000	0.000	0.000	0.000	0.012	1
Royal Spoonbill	0.000	0.000	0.026	0.000	0.018	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.333	0.000	0.000	0.030	4
Rufous Songlark	0.167	0.000	0.026	0.000	0.018	0.000	0.333	0.000	0.167	0.000	0.000	0.000	0.000	0.000	0.000	0.033	5
Rufous Whistler	0.306	0.000	0.026	0.179	0.070	0.000	0.500	0.095	0.667	0.000	0.000	0.000	0.000	0.000	0.222	0.120	8
Sacred Kingfisher	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.167	0.000	0.000	0.000	0.000	0.000	0.000	0.003	1
Sharp-tailed Sandpiper	0.000	0.000	0.000	0.000	0.018	0.000	0.000	0.000	0.000	0.000	0.042	0.000	0.000	0.000	0.000	0.009	2
Shining Bronze-Cuckoo	0.167	0.000	0.000	0.051	0.088	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.039	3
Shy Heathwren	0.000	0.000	0.000	0.026	0.000	0.000	0.000	0.190	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015	2
Silver Gull	0.083	0.000	0.128	0.026	0.211	0.238	0.000	0.000	0.000	1.000	0.271	0.000	0.000	0.000	0.028	0.129	8
Silvereye	0.306	0.833	0.282	0.590	0.333	0.000	0.333	0.286	0.167	0.333	0.292	0.167	0.167	0.000	0.278	0.315	13
Singing Honeyeater	0.111	0.167	0.359	0.641	0.474	0.286	0.000	0.286	0.000	0.000	0.479	0.167	0.000	0.000	0.472	0.372	10
Southern Emu-wren	0.000	0.000	0.000	0.000	0.035	0.000	0.000	0.000	0.000	0.000	0.042	0.667	0.000	0.000	0.000	0.024	3
Southern Scrub Robin	0.000	0.000	0.000	0.077	0.000	0.000	0.000	0.143	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.018	2
Spiny-cheeked Honeyeater	0.278	0.000	0.205	0.590	0.333	0.286	0.000	0.619	0.000	0.000	0.146	0.000	0.000	0.000	0.389	0.300	8
Spotted Dove	0.000	0.000	0.205	0.103	0.158	0.286	0.000	0.000	0.000	0.333	0.063	0.000	0.000	0.000	0.111	0.105	7



Common name	1	2	3	4	5	6.1	6.2	6.3	6.4	7.0	9.0	10.1	10.2	10.3	10.4	Overall reporting rate	Number of ecosystems
Spotted Harrier	0.111	0.000	0.077	0.000	0.088	0.048	0.000	0.000	0.000	0.000	0.042	0.167	0.000	0.000	0.111	0.060	7
Spotted Pardalote	0.306	0.167	0.000	0.051	0.000	0.238	0.000	0.524	0.167	0.000	0.000	0.000	0.167	0.000	0.000	0.096	7
Straw-necked Ibis	0.222	0.167	0.103	0.205	0.211	0.143	0.167	0.143	0.167	0.333	0.146	0.667	0.333	0.000	0.028	0.168	14
Striated Pardalote	0.278	0.500	0.000	0.026	0.053	0.000	0.833	0.095	0.833	0.000	0.000	0.000	0.833	0.000	0.056	0.108	9
Striated Thornbill	0.111	0.333	0.026	0.000	0.000	0.048	0.500	0.000	0.333	0.000	0.000	0.000	0.000	0.000	0.000	0.039	6
Stubble Quail	0.083	0.000	0.385	0.077	0.175	0.143	0.167	0.000	0.167	0.000	0.083	0.167	0.000	0.000	0.194	0.144	10
Sulphur-crested Cockatoo	0.056	0.000	0.000	0.000	0.000	0.000	0.167	0.000	0.333	0.000	0.000	0.000	0.000	0.000	0.000	0.015	3
Superb Fairy-wren	0.694	1.000	0.385	0.590	0.421	0.381	1.000	0.429	1.000	1.000	0.625	0.500	0.500	0.000	0.639	0.553	14
Swamp Harrier	0.083	0.000	0.103	0.026	0.105	0.143	0.000	0.048	0.000	0.333	0.188	0.500	0.000	0.000	0.083	0.102	10
Tawny-crowned Honeyeater	0.000	0.167	0.000	0.026	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	2
Tree Martin	0.194	0.333	0.026	0.000	0.035	0.048	0.000	0.000	0.833	0.000	0.000	0.000	0.500	0.000	0.000	0.063	7
Varied Sitella	0.000	0.167	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	1
Variegated Fairy-wren	0.000	0.000	0.000	0.077	0.018	0.000	0.000	0.333	0.000	0.000	0.021	0.000	0.000	0.000	0.056	0.042	5
Wedge-tailed Eagle	0.028	0.000	0.026	0.000	0.018	0.000	0.000	0.000	0.000	0.000	0.042	0.000	0.000	0.000	0.000	0.015	4
Weebill	0.389	0.167	0.000	0.205	0.070	0.238	0.500	0.286	0.667	0.000	0.000	0.000	0.000	0.000	0.083	0.144	9
Welcome Swallow	0.306	0.500	0.256	0.256	0.561	0.333	0.333	0.238	0.167	0.000	0.333	0.500	0.833	0.000	0.194	0.336	13
Whiskered Tern	0.139	0.000	0.333	0.026	0.333	0.143	0.000	0.000	0.000	0.667	0.604	0.500	0.000	0.000	0.056	0.231	9
Whistling Kite	0.028	0.000	0.179	0.128	0.158	0.190	0.000	0.048	0.000	0.000	0.188	0.167	0.333	0.000	0.167	0.135	10
White-backed Swallow	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.028	0.003	1
White-browed Babbler	0.278	0.167	0.077	0.256	0.035	0.048	0.000	0.429	0.333	0.000	0.021	0.000	0.000	0.000	0.250	0.144	10
White-browed Scrubwren	0.028	0.167	0.077	0.051	0.035	0.000	0.000	0.000	0.000	0.000	0.104	0.000	0.000	0.000	0.056	0.048	7
White-browed Woodswallow	0.333	0.000	0.051	0.154	0.123	0.000	0.000	0.190	0.167	0.000	0.021	0.000	0.000	0.000	0.111	0.111	8
White-faced Heron	0.028	0.000	0.026	0.026	0.088	0.000	0.000	0.048	0.000	0.000	0.083	0.000	0.667	0.000	0.000	0.051	7
White-fronted Chat	0.000	0.000	0.128	0.154	0.070	0.048	0.000	0.000	0.000	0.000	0.333	0.000	0.000	0.000	0.139	0.111	6
White-fronted Honeyeater	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.143	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	1
White-naped Honeyeater	0.000	0.000	0.000	0.000	0.000	0.000	0.167	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	1



Common name	1	2	3	4	5	6.1	6.2	6.3	6.4	7.0	9.0	10.1	10.2	10.3	10.4	Overall reporting rate	Number of ecosystems
White-necked Heron	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.000	0.333	0.000	0.000	0.009	2
White-plumed Honeyeater	0.361	0.167	0.077	0.026	0.105	0.286	0.500	0.095	0.000	0.000	0.042	0.167	0.667	0.000	0.028	0.129	12
White-winged Black Tern	0.028	0.000	0.000	0.026	0.018	0.000	0.000	0.000	0.000	0.000	0.104	0.000	0.000	0.000	0.028	0.027	5
White-winged Triller	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.028	0.030	2
Willie Wagtail	0.333	0.000	0.128	0.333	0.421	0.333	0.333	0.333	0.000	0.000	0.229	0.000	0.833	0.000	0.222	0.282	10
Yellow Thornbill	0.250	0.167	0.026	0.282	0.140	0.143	0.500	0.238	0.167	0.000	0.104	0.000	0.000	0.000	0.417	0.186	11
Yellow-billed Spoonbill	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.167	0.000	0.000	0.003	1
Yellow-faced Honeyeater	0.000	0.000	0.000	0.000	0.000	0.000	0.167	0.000	0.167	0.000	0.021	0.000	0.000	0.000	0.028	0.012	4
Yellow-plumed Honeyeater	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.095	0.167	0.000	0.000	0.000	0.000	0.000	0.000	0.009	2
Yellow-rumped Thornbill	0.250	0.333	0.051	0.154	0.281	0.333	0.333	0.190	0.167	0.000	0.083	0.000	0.000	0.000	0.278	0.189	11
Yellow-tailed Black-cockatoo	0.111	0.167	0.000	0.000	0.000	0.000	0.000	0.000	0.167	0.000	0.000	0.000	0.000	0.000	0.000	0.018	3
Zebra Finch	0.028	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	1