

Conservation of Carnaby's Black-Cockatoo on the Swan Coastal Plain, Western Australia

December 2006



Bansi Shah
Birds Australia WA

167 Perry Lakes Drive, FLOREAT WA 6014

Tel: (08) 9383 7749, Fax: (08) 9387 8412

Email: mail@birdswa.com.au

Web: www.carnabyscockatoo.org

This project was funded by
an anonymous donation to
Birds Australia WA

Table of Contents

i. Acknowledgements	3
ii. Executive Summary	4
1. Introduction	5
2. Project objectives	8
3. Methods and data collection	8
a. Population estimates and relative abundance	8
b. Roost site use and fidelity	14
c. Flock following – a day in the life of a Carnaby's Cockatoo flock	15
d. Food plant species used by Carnaby's Cockatoo	16
4. Results	16
a. Population estimates and relative abundance	16
b. Roost site use and fidelity	20
c. Flock following – a day in the life of a Carnaby's Cockatoo flock	23
d. Food plant species used by Carnaby's Cockatoo	32
e. Popular publications & publicity	34
f. Volunteer participation	35
g. Community activity resulting from the project	35
5. Discussion – assessment of methods	36
a. Population estimates and relative abundance	36
b. Roost site use and fidelity	38
c. Flock following – a day in the life of a Carnaby's Cockatoo flock	38
d. Food plant species used by Carnaby's Cockatoo	39
6. General Discussion	40
7. Summary	42
8. Future Directions	42
9. Conservation Implications	42
10. Further Reading	43
11. Appendices	45
Appendix 1: Area count form	45
Appendix 2: Roost count form	49
Appendix 3: Transect search form	51
Appendix 4: Roost fidelity form	54
Appendix 5: Feeding form	56
Appendix 6: Newspaper articles	58
Appendix 7: Popular articles	65
Appendix 8: Abstract for presentation at BA National Congress, 2006	74

i. Acknowledgements

This project would not have been possible without funding through a generous anonymous donation to Birds Australia WA. The project was conducted in partnership with the WA Department of Environment and Conservation and WWF-Australia.

The Birds Australia WA Carnaby's Black-Cockatoo Management Committee comprised John Blyth, Robert Davis and Cheryl Gole. Technical and scientific advice was provided by the Technical Advisory Group comprising John Blyth (BAWA), Allan Burbidge (BAWA, DEC), Robert Davis (BAWA), Rick Dawson (DEC), Cheryl Gole (BAWA, WWF), Dave Mitchell (DEC) and Matt Williams (DEC). Clayton Sanders (DEC) coordinated the flock-following exercise, and kindly donated the time of DEC Wanneroo staff.

Numerous others assisted with advice and various aspects of the project; Mike Bamford, Robert Black and Mike Craig provided input; Kellie Mantle provided mapping assistance and Phil Withers provided additional statistical assistance. A number of organisations, including radio and newspaper media, helped disseminate information to obtain volunteers. John Blyth, Robert Davis and Cheryl Gole provided much appreciated comments on various drafts of this and other reports.

My thanks also to my partner Mark Galley, who created the website, provided countless hours of technical assistance and patiently put up with my long days and late nights.

Finally, this project was made possible by the hundreds of volunteers who gave up their time to participate in surveys and assist with data collection and management. A huge thank you to each and every person that participated in the project, and especially all those volunteers who gave up a significant amount of their time to collect the data required to produce this report.



Photo: Gerhard Perth Digital

ii. Executive Summary

Once numerous in Western Australia, the highly mobile Carnaby's Black-Cockatoo (*Calyptorhynchus latirostris*) is now listed as endangered, with populations declining dramatically due to land clearing for agriculture in regional areas and for urban development around Perth. The last 45 years has seen a 50% decrease in the species' range and abundance, with local extinctions in some regions.

This project aimed to collect critically important baseline information to assist future conservation planning in the rapidly developing Swan region. Area and roost counts were conducted on a number of days in order to determine relative abundance and minimum population size. Roost counts were continued over a number of days and a longer-term study was conducted over four months to determine whether birds returned to the same roost sites. To determine movement patterns and potentially important areas for Carnaby's Cockatoos, a flock-following exercise was conducted over a number of days in Perth's northern region, which contains large areas of pine plantation and native vegetation. Feeding information was gathered over a nine month period to determine what native and non-native plant species were being used for food by the birds.

A minimum population estimate of 4510 was obtained via a roost count on 29 April 2006. Carnaby's Cockatoos occurred over the entire Swan Coastal Plain and in all types of habitat. The birds were most abundant in areas which contained a high proportion of pine plantations or remnant pines and areas with native bush, such as the northern region, Rockingham-Peel region and the South Metro region. Birds were least abundant in highly urbanised and cleared areas, such as the North Metro region. Carnaby's Cockatoos used the same roost sites over a period of time, and identified roost sites were primarily tall pine trees and Eucalypt trees with apparently dense canopies. Flocks in the northern region used the pine plantations for roosting and feeding in the morning and afternoon, moving into the surrounding area in the middle of the day, particularly towards surface water from which to drink. Flocks generally moved up to 13 km within a day, with a maximum distance of 6.84km covered in one hour, the greatest distances generally being covered in the early morning or late evening. Birds were observed feeding on both native and non-native plant species; primarily native *Banksia* spp. and introduced *Pinus* spp. Significantly, pine plantations appeared to play an important role in the ecology of Carnaby's Cockatoos on the Swan Coastal Plain – a large proportion of birds counted were in pine plantations, roosted in pine trees, and fed on pine cones.

These studies show that Carnaby's Cockatoos use the entire landscape of the Swan Coastal Plain, with a significant preference for large tracts of native vegetation and pine plantations. These results have important conservation implications for the Carnaby's Cockatoo population with respect to clearing, and possibly fragmentation, of the remaining native vegetation in and around the Perth metropolitan area. Progressive removal over the next 10 – 20 years of pine plantations and remnant pine trees on the Swan Coastal Plain will have a significant negative impact on the population of Carnaby's Cockatoos using the Swan Coastal Plain. Measures will need to be taken by the government to ameliorate impacts on this endangered endemic species.

1. Introduction

Once numerous in Western Australia, the highly mobile Carnaby's Black-Cockatoo (*Calyptorhynchus latirostris*) is now listed as endangered, with populations declining dramatically due to land clearing for agriculture in regional areas and for urban development around Perth. The last 45 years has seen a 50% decrease in the species' range and abundance, with local extinctions in some regions.

The life history of this distinctive cockatoo makes it extremely vulnerable to threats resulting from human activities. Pairs bond for life, and use large hollows in Eucalypt trees to produce just one chick per year. Hollows may not form in those trees for 120 – 150 years and competition for hollows is increasing from feral bees, Little Corella (*Cacatua pastinator*) and Galah (*Cacatua roseicapilla*). Little Corella and Galah have been anecdotally reported to display aggression towards Carnaby's Cockatoos and also compete for the finite and shrinking food resource, including that on the Swan Coastal Plain.

Carnaby's Cockatoos are believed to breed mostly in the wheatbelt, returning to coastal and near coastal areas from late December to July (see Fig 1 for distribution map). However, recently confirmed breeding on the Swan Coastal Plain emphasises the region's potential significance if, as appears likely, the species is increasingly being forced to find new habitats and is moving coastwards. The birds feed on seeds, nuts and flowers of a large variety of plants including Proteaceous species (e.g. *Banksia*, *Dryandra* and *Grevillea*), *Corymbia callophylla* nuts, and a range of introduced species, notably seeds from cones of *Pinus* spp. Much of the Swan Coastal Plain has been cleared for urban development, and remnant vegetation is dominated by *Banksia* woodland. The accelerated rate of clearing of feeding habitat on the Swan Coastal Plain for urban development poses a significant threat to the long term survival of Carnaby's Cockatoos. Despite such potential threats to the survival of the species, little is known about the potential impacts on the Carnaby's Cockatoos using the Swan Coastal Plain. For example, whilst the numbers of Cockatoos in individual flocks have been estimated and provided through anecdotal records in the past, there have been no systematic attempts to estimate population using the Plain during the non-breeding season and no known methodology for obtaining an estimate. Furthermore, little is known about the patterns of abundance of the cockatoos on the Swan Coastal Plain, or the critical habitat requirements of the cockatoos.

This one year project was therefore designed to provide baseline information about the patterns of abundance and a minimum population estimate of the cockatoos on the Swan Coastal Plain (Fig. 2), to direct further studies and enable effective future conservation planning for the species.

The vision statement for this project states that:

The Carnaby's Black-Cockatoo Swan Coastal Plain Project will provide survey data and other information that will better allow for conservation planning for the species in this rapidly developing region. The identification of critical habitat requirements will allow for sensitive urban development and appropriate planning for areas such as the Gnangara Park, thus ensuring the long-term survival of the species in the Swan Region.



Figure 1: Map of the distribution of Carnaby's Cockatoo in south-west Western Australia (map prepared by Tamra Chapman, DEC).



Figure 2: Map of the Swan Coastal Plain of Western Australia showing remnant vegetation, and the survey region for the study.

2. Project objectives

1. To estimate the relative abundance at various places and a minimum population size of Carnaby's Cockatoos on the Swan Coastal Plain of Western Australia.
2. To determine important roosting and foraging sites for Carnaby's Cockatoo.
3. To determine food resources utilised by Carnaby's Cockatoo.

3. Methods and data collection

a. Population estimates and relative abundance

Methods

Rationale

Population estimate and relative abundance of Carnaby's Cockatoo were not previously available, and no clear method was known or had been trialled for conducting a population census of these very mobile birds.

Study site

For the purposes of this study, the Swan Coastal Plain of Western Australia was defined as the area bounded by Gingin to the north, Bunbury to the south, and the Darling scarp to the east (Fig. 1). For logistical purposes, the Plain was further divided into five geographical regions of varying size, which also represented different dominant land uses (Fig. 3). The 'Northern region' is considerably vegetated and includes native bushland in unallocated Crown land, nature reserves and national parks, with large areas of pine plantations. 'North Metro' and 'South Metro' are both highly urbanised, whilst the 'Rockingham to Peel' region has a mix of urbanisation along the coast, cleared and rural properties inland with pockets of native Bushland and some pine plantations. The 'Southern Region' is made up of predominantly cleared rural properties, with small pockets of native vegetation and some small towns.

Field studies – area count

Four surveys of 2.5 hours total duration each were conducted in the afternoon on set dates, including 130 minutes pre-sunset and 20 minutes post-sunset observation time. A trial was conducted on 4 December 2005, to test the count method, and determine the range of distances over which an observer was likely to see birds. Three full scale public surveys were conducted on 12 February, 26 March and 14 May 2006. Assistance was elicited from volunteer observers. Volunteer coordinators were also sought for the coordination of volunteer observers within the geographic regions above. A total of 239 sites were covered during the 12 February survey, 153 sites were covered on 26 March and 121 sites were covered on 14 May (Fig. 4). Volunteer observers within each region contacted coordinators and nominated sites at which they were able to count. Sites were located anywhere within the survey region and included home gardens in urban areas, local parks, reserves, national parks, pine plantations and rural properties. If observers did not nominate a site, they were allocated a site in an area lacking sufficient coverage.

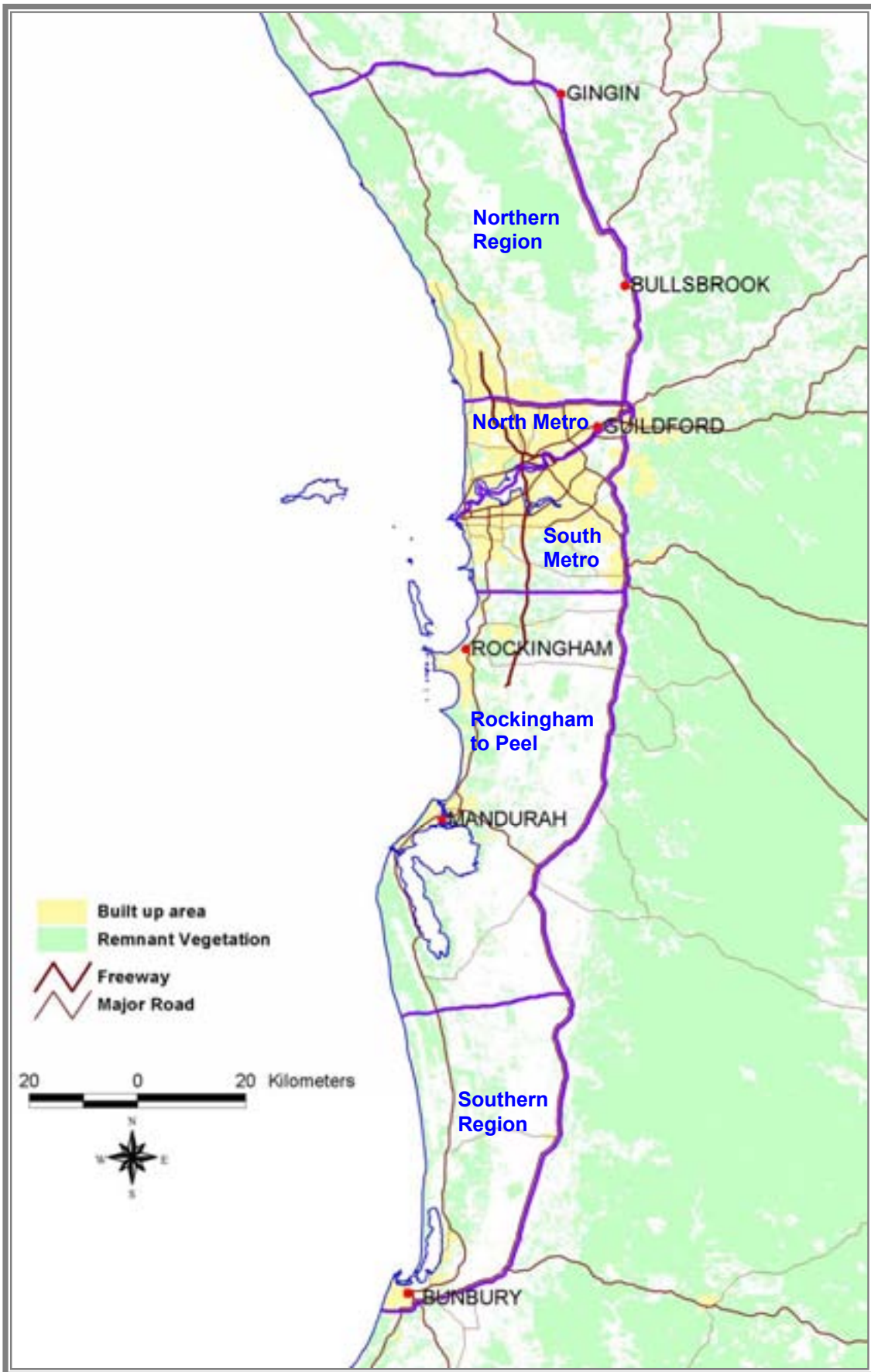


Figure 3: Map of the Swan Coastal Plain of Western Australia showing built up areas and remnant vegetation, with survey regions and boundaries marked.

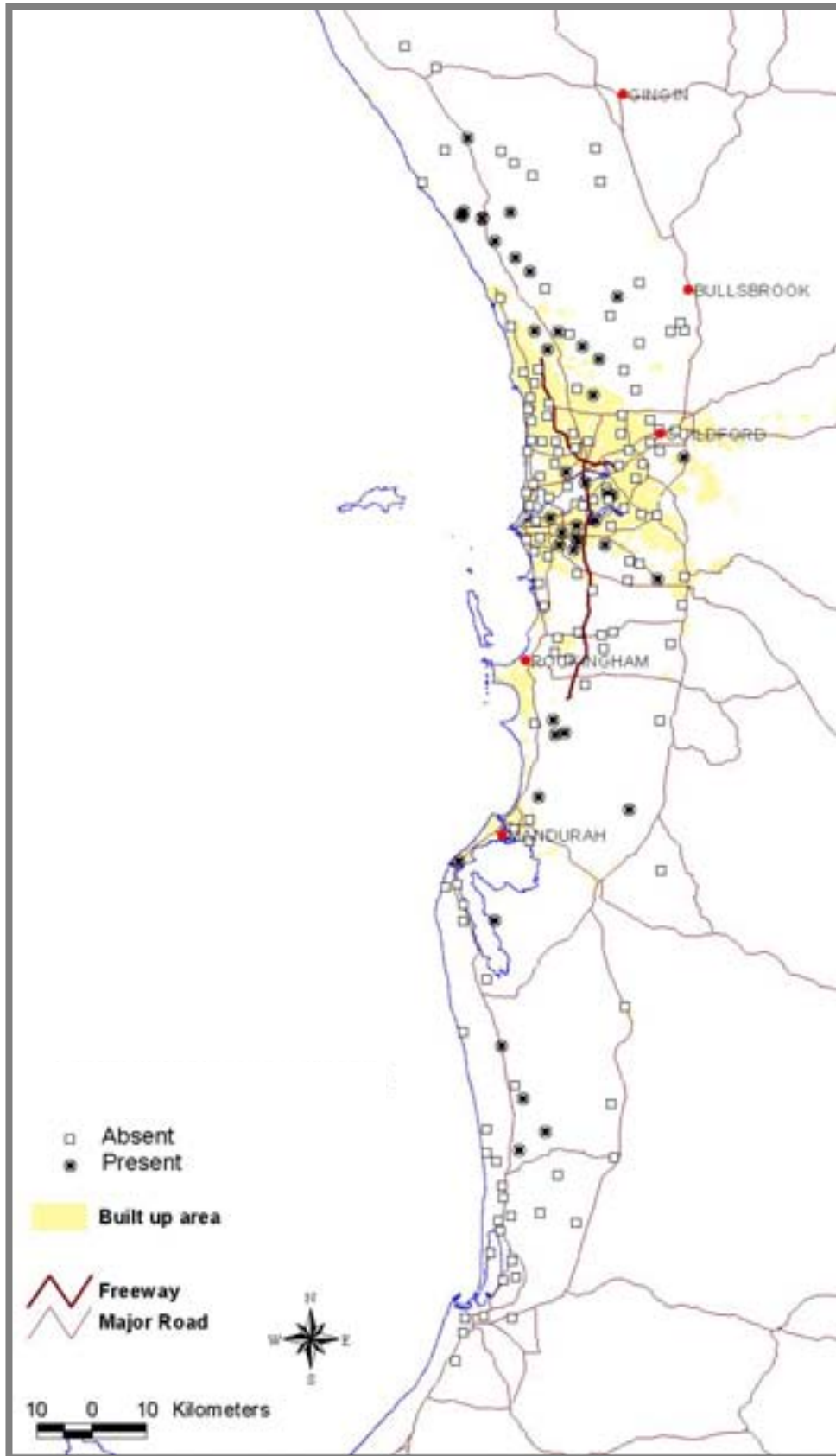


Figure 4a: Map of the Swan Coastal Plain of Western Australia showing where birds were present or absent, across 170 sites on the Swan Coastal Plain, 12 February 2006, after elimination of sites within 2 km of each other.

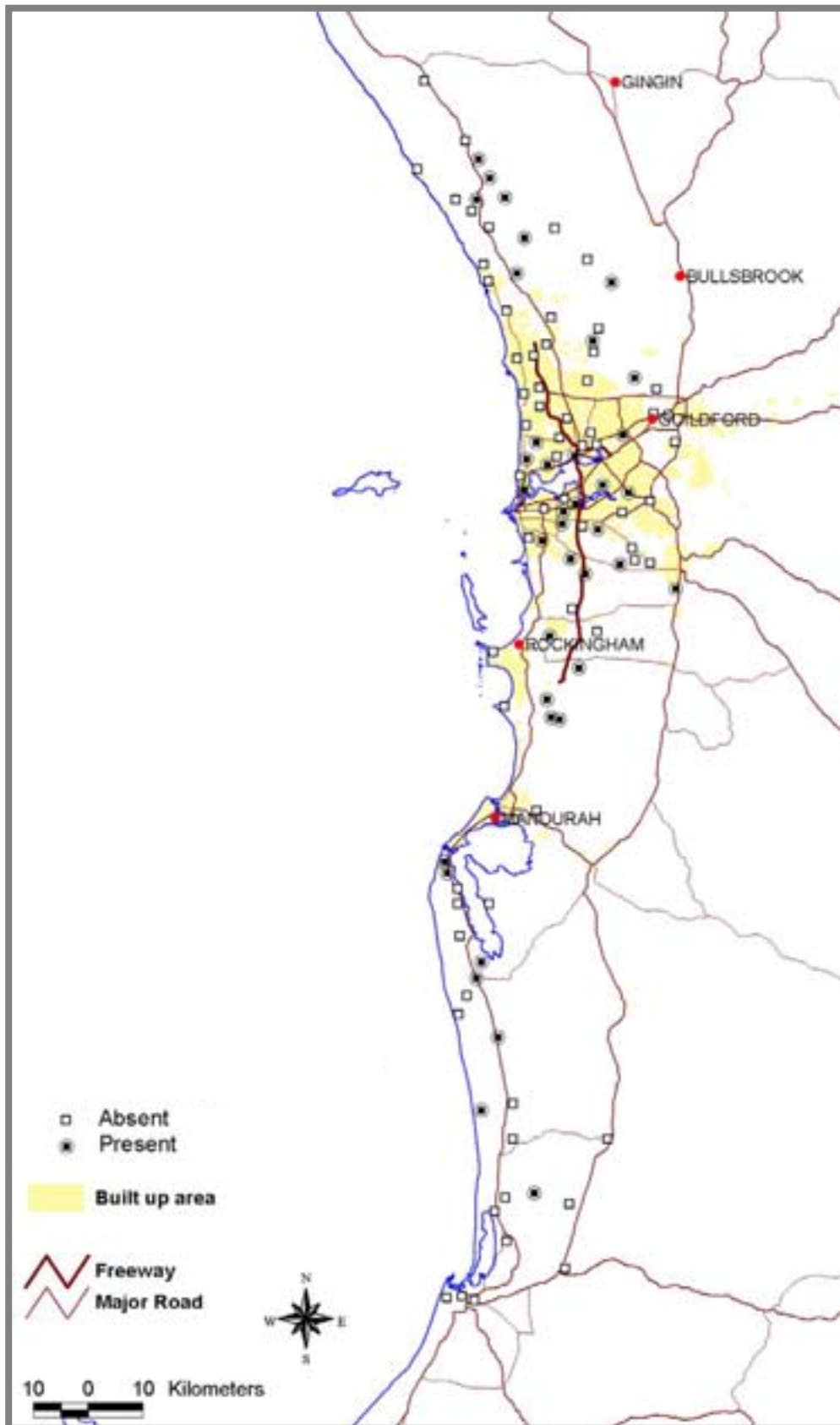


Figure 4b: Map of the Swan Coastal Plain of Western Australia showing where birds were present or absent, across 107 sites on the Swan Coastal Plain, 26 March 2006, after elimination of sites within 2 km of each other.

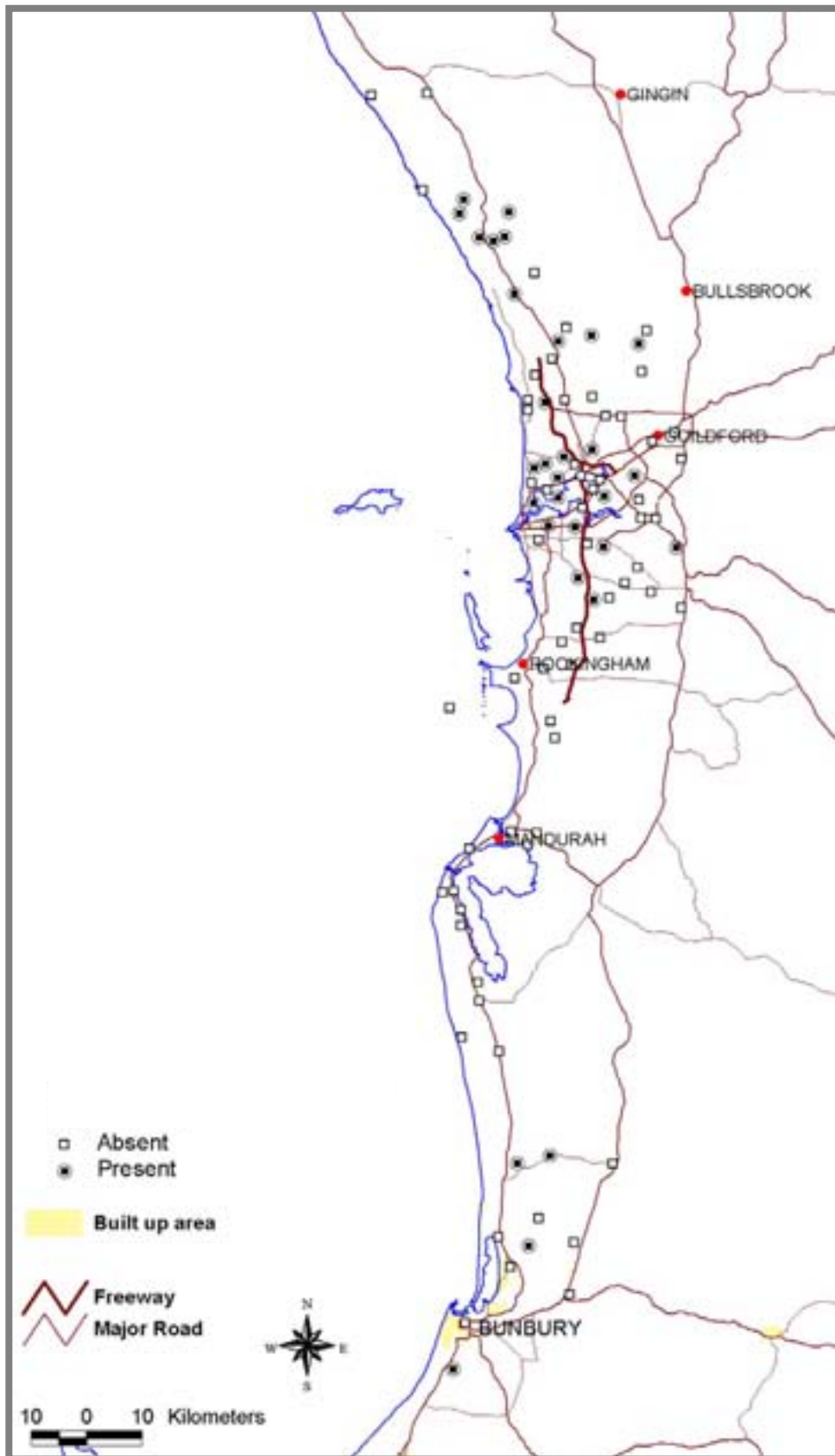


Figure 4c: Map of the Swan Coastal Plain of Western Australia showing where birds were present or absent, across 94 sites on the Swan Coastal Plain, 14 May 2006, after elimination of sites within 2 km of each other.

Observers were provided with survey instructions and forms on which to complete sighting details, including location, habitat (urban, native bush, pine plantation or cleared land), number of cockatoos counted, time of count, activity, flight direction and distance from observer (see **Appendix 1** for an example survey form). Observers were directed to remain within 20 m of their allocated site for the duration of the count.

Selection of observation sites was designed to overcome some of the problems presented by the mobility of Carnaby's Cockatoos. In the flock-following exercise below, flocks in the 'Northern Region' were found to travel 11 – 12 km within two hours and at speeds of between 0 and 6.8 km/h at different times of day, feeding and resting throughout the day, drinking water in the morning and late afternoon. Assuming the highest speed of 6.8 km/h, the cockatoos would, at most, travel 1.1 km in 10 minutes. The trial survey in December 2005 showed that the average distance between observer and bird when observed was 347 m, but ranged from 3 – 1000m. To reduce the chance of double counting and to increase the area of the Plain covered, we assumed a field of view of one kilometre for each stationary observer, and sites were to be at least two kilometres apart.

During data collation and entry, all records were carefully checked and individual observers consulted regarding the possibility and subsequent elimination of double counting, based on the numbers of birds seen, flight direction and activity.

Field studies – roost count

Potential overnight roost sites on the Swan Coastal Plain of Western Australia were initially identified by anecdotal reports and during area counts above. We obtained a total count of birds roosting by stationing an observer at each reported site on 9 April 2006 from 18 minutes prior to sunset to 57 minutes after sunset. By this time, no more birds could be seen or heard arriving at or leaving the site. Observers used a number of techniques to obtain a total count, including direct roost counts, and counting of incoming and out-going flocks to arrive at a maximum count. Birds that arrived at the site, remained for at least 15 minutes after dark and settled down were deemed to be roosting overnight (see **Appendix 2** for an example survey form).

Field studies – transect count

A transect search was conducted to test whether it was a suitable method for counting and estimating the population of Carnaby's Cockatoos. The survey was conducted on the morning of 29 April 2006, for four hours from 7.30 – 11.30am. Several 15-20 km, U-shaped transects were determined, with each transect traversing pine plantations and native bush in the Yanchep/ Pinjarra/ Gnangara area, in an East-West direction. Volunteers drove the transects at a speed of 10 kph, stopping every 500m to look and listen for Carnaby's Cockatoos. If a flock was seen, the flock location, the number of birds in the flock, and activity of the birds was recorded (see **Appendix 3** for an example survey form and instructions). This study was also trialled as a method to determine where cockatoos were feeding in the morning, and what they were feeding on.

Minimum population count

To obtain a minimum population estimate on the Swan Coastal Plain using the area count, we divided each survey's 2.5 hour observation period into 15 consecutive, 10 minute snapshots as

repeated measures. This was done to eliminate any potential double-counting resulting from the birds being counted at different sites. If any sites were less than two kilometres apart, one or more sites were eliminated until all sites were two or more kilometres apart (Fig. 4). The site with the least number of birds seen was eliminated first. If no birds were seen at any overlapping site, one site was eliminated at random.

To obtain a minimum population estimate on the Swan Coastal Plain using the roost count, we added up the total overnight roosting birds counted by each observer. As these counts were obtained at the same time, or within 5 minutes of each other, the chance of double counting was minimal.

Relative abundance

The proportion of total birds seen in each of the five regions, and the proportion of sites in the regions in which birds were sighted, were used as measures of abundance of the birds in the regions. The proportion of birds seen in each different habitat was used as an indicator of site use and abundance in that habitat. The proportion of birds engaged in various activities (flying, feeding, drinking and resting) was used as an indicator of behaviour during the late afternoon period of the surveys.

b. Roost site use and fidelity

Methods

Rationale

Roost counts were conducted on 9 April to obtain a population estimate, as described above. These sites had been previously reported by observers and the general public. The presence of Carnaby's Cockatoos at these sites on more than one evening suggested that the sites may be important for the birds. A roost site fidelity study was therefore conducted to determine whether birds return to the same roost sites and if so, whether the same numbers return to the sites each night. A roost site fidelity study was conducted at a single location to determine whether the pattern changed over time, and to determine seasonal changes.

Identification of overnight roost sites

Potential overnight roost sites on the Swan Coastal Plain of Western Australia were initially identified by anecdotal reports and later confirmed by the roost count conducted above. Potential roost sites reported after 9 April 2006 were visited by observers and are reported here.

Do Carnaby's Cockatoos display roost site fidelity?

We selected eight known overnight roost sites from the list of confirmed roost sites above. Observers were stationed at each of these sites for 60 minutes, including 15 minutes after sunset, and the counts were conducted over a period of nine evenings from 29 April to 7 May 2006. Observations at each site were conducted by the same observer to eliminate observer bias. The number of roost site counts obtained varied from two at one site, up to nine at another.

Observers were instructed to arrive at their allocated roost site 60 minutes before sunset and to remain at the site until no more birds could be seen or heard arriving at or leaving the site. Observers counted the total number of birds roosting overnight and used a number of techniques, including direct roost counts, and counting of incoming and out-going flocks to arrive at a maximum count (see **Appendix 4** for an example survey form).

Observations from two of the eight roost sites were eliminated due to duplicated efforts by multiple observers at those two sites. We tested the data from the remaining six roost sites against the null hypothesis of an equal number of birds roosting overnight at each site for the nine day duration, using Pearson's Chi-square tests.

Does roost site fidelity change over time?

One roost site was selected as a case study to determine whether roost site fidelity changed over time. An observer counted roosting birds over a 20 week period from 29 April to 14 September 2006. The counting technique employed was as above and all counts were conducted by the same observer.

We tested these data against the null hypothesis of an equal number of birds roosting overnight during each period, using Pearson's Chi-square tests. We tested the variability of these data on a daily and weekly basis using a coefficient of variation.

c. Flock following – a day in the life of a Carnaby's Cockatoo flock

Methods

Rationale

The flock following exercise was conducted to determine daily movement and activity patterns of, and the food plant species used by, Carnaby's Cockatoos in the northern regions of the Swan Coastal Plain. The exercise was coordinated and conducted by Clayton Sanders, Senior Operations Officer at the Wanneroo office of the Department of Environment and Conservation (DEC), using his staff and DEC vehicles.

Study site

This study was conducted in the area surrounding Gngangara Pine Plantation and Yanchep National Park in the northern region of the Swan Coastal Plain (Fig. 3). This area was ideal due to the good networks of roads available, and lack of public traffic. Carnaby's Cockatoos feed on the nuts in the pine cones of the introduced *Pinus pinaster* in the Gngangara Pine Plantation. They also feed in Yanchep National Park, which is dominated by Banksia woodland. The area between Gngangara and Yanchep is primarily rural with pockets of native bushland.

Field studies

The study was conducted on three days: 21, 28 and 29 April 2006. Flocks were found and followed throughout the three days, for varying lengths of time. Pairs of observers in four-wheel-drive vehicles began looking for and following flocks by driving through Gngangara Pine Plantation at various times of day, the earliest beginning 36 minutes before sunrise, and the latest finishing 62 minutes after sunset. Flocks were observed and followed for between 55

and 632 minutes. Nine flocks were found and followed in the morning only, five flocks were found and followed in the afternoon only, and three flocks were found in the morning and followed throughout the day.

When a flock was found, observers noted flock location, time observed, number of birds and activity. Notes were made throughout the observation period, including duration and changes in flock activity, flight direction when the flock moved and new location of flocks. In cases where the flock subdivided, this was also noted, and where possible, the location and movement of each new flock was noted.

The movement of each flock observed was mapped and the distances travelled calculated based the locations provided. This was divided by the duration of each observation period in the morning, afternoon and all day to give a maximum distance travelled within an hour.

d. Food plant species used by Carnaby's Cockatoo

Methods

Rationale

Information about the plants on which Carnaby's Cockatoo were feeding was collected to enable a future assessment of important or critical habitat for the birds.

Field studies

Volunteers were sought to record observations any time they saw Carnaby's Cockatoos feeding anywhere on the Swan Coastal Plain (Fig. 2). Forms were provided, requesting information including date, location of birds, number of birds seen feeding, and plant species on which the birds were feeding (see **Appendix 5** for example of form).

4. Results

a. Population estimates and relative abundance

Minimum population count

The number of birds counted during the 15 consecutive 10 minute periods of the area count was variable on all three survey dates, ranging from 33 – 722 during the 12 February count, 203 – 2633 during the 26 March count and 0 – 855 during the 14 May count (Fig. 5). The average numbers of birds counted during the 15 consecutive time periods were 269.4 on 12 February, 842.5 on 26 March and 219.7 on 14 May 2006. The minimum population estimate varied from 722 on 12 February, to 2633 on 26 March to 855 on 14 May 2006. The total number of birds counted during the roost count on 9 April 2006 was 4510. Therefore the minimum population estimate obtained over the 2006 non-breeding season was 4510.

Relative abundance

The abundance of Carnaby's Cockatoos was relatively higher in some regions than in others (Fig. 6). The northern region contained a consistently large proportion of the total sightings (30

– 44%; Figs. 6a, c, e), as well as having a relatively large proportion of all sites in which cockatoos were seen (28 – 31%; Figs. 6b, d, f). Whilst the North Metro area had few bird sightings and sites with birds during February and March surveys (0 - 4%; Figs. 6a – d) a relatively large proportion of sightings in May were in this region (23%; Figs. 6e, f). By comparison, the South Metro area had a greater proportion of sightings than North Metro area during the February and March surveys. Over half of all sightings in March were in the Rockingham-Peel region (56%; Fig. 6c), primarily at Karnup Pine Plantation, although it only accounted for 26% of all sites at which birds were seen throughout all regions (Fig. 6d).

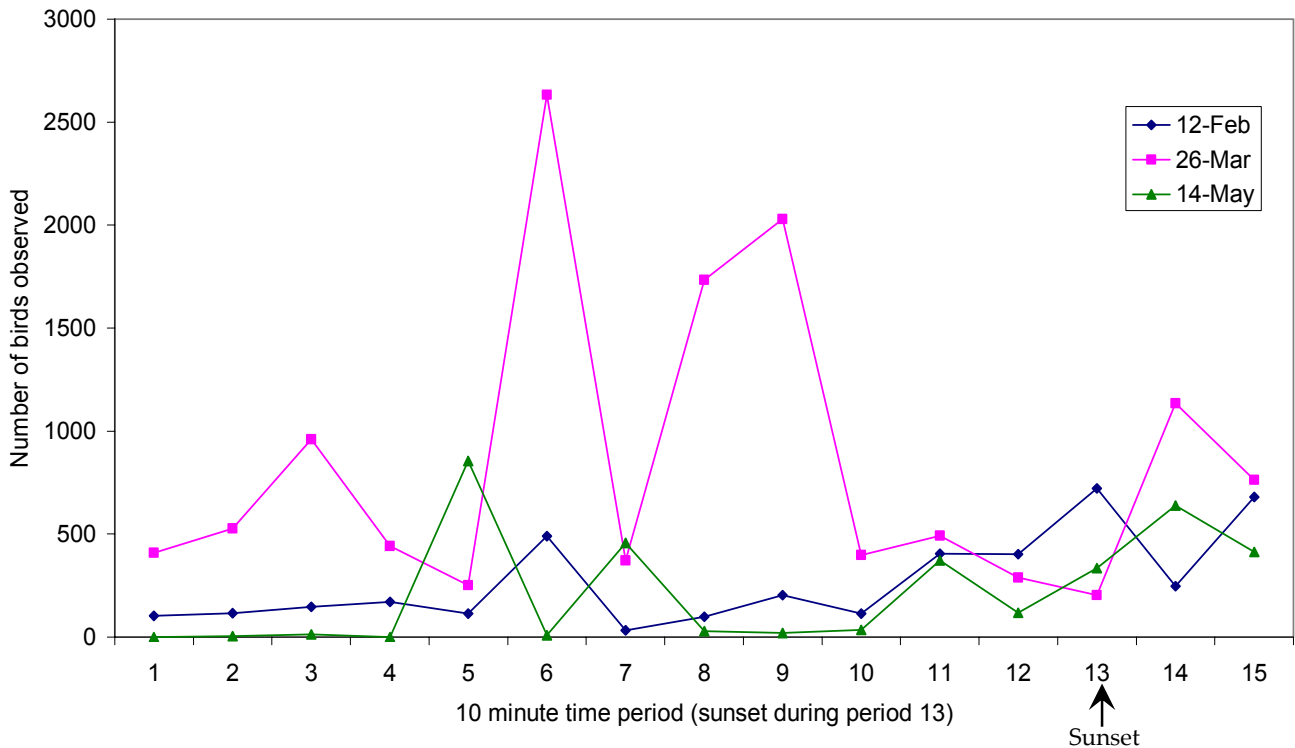
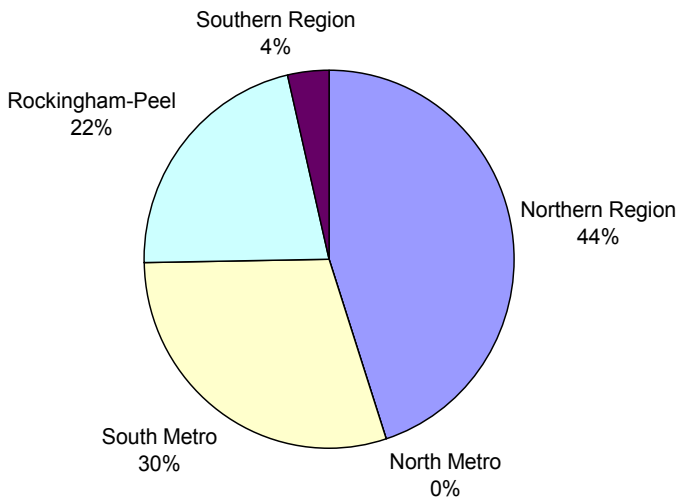


Figure 5: Carnaby's Cockatoo (*Calyptorhynchus latirostris*) population estimates during 15 consecutive 10 minute periods on 12 February, 26 March and 14 May 2006.

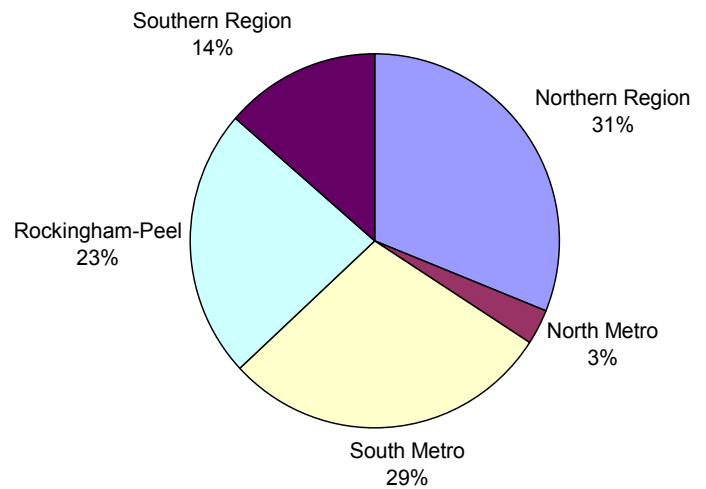
Of the sites at which birds were seen, a large percentage were either natural bush (18 – 29%), or a combination of natural bush and another land use, with up to 71% of sites including some natural bush (Fig. 7). The percentage of total birds seen that occurred in natural bush ranged from 10 – 30, and up to 63% in sites with a combination of land uses. Whilst pine plantations formed a small proportion of sites in which birds were seen (5 - 11%), they accounted for a relatively large proportion of total birds seen (17 - 40%), and up to 70% of birds in sites with a combination of land uses. By comparison, urban areas formed a small proportion of both sites in which birds were seen (5 – 16%) and the proportion of total birds seen (0 – 12%). Similarly, cleared areas accounted for just 5 – 10% of sites in which birds were seen, and 0 – 2% of total birds seen.

Carnaby's Cockatoos engaged in a combination of activities during all surveys, with a large proportion flying over, into or out of the observation site. Similar proportions of birds were seen feeding (21%, 19% and 21%) and drinking (11%, 8% and 14%) during each survey in February, March and May, respectively.

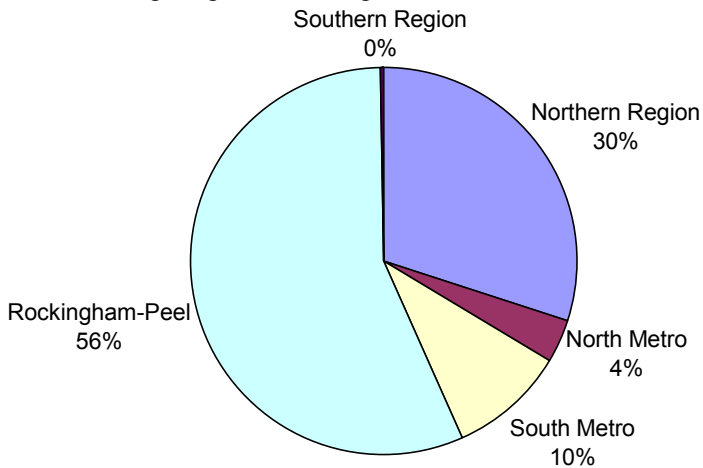
a) 12 February 2006, percentage of total sightings in each region.



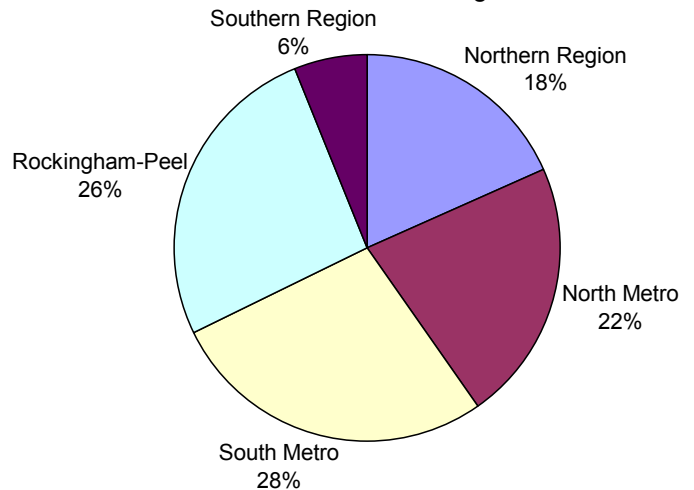
b) 12 February 2006, percentage of total sites in which birds were seen in each region.



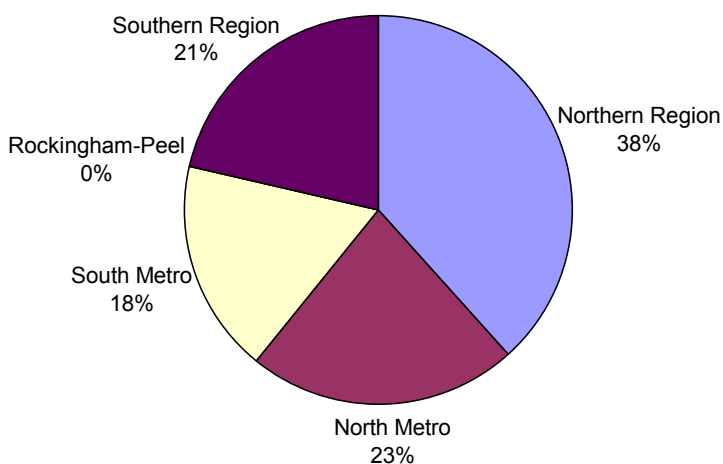
c) 26 March 2006, percentage of total sightings in each region.



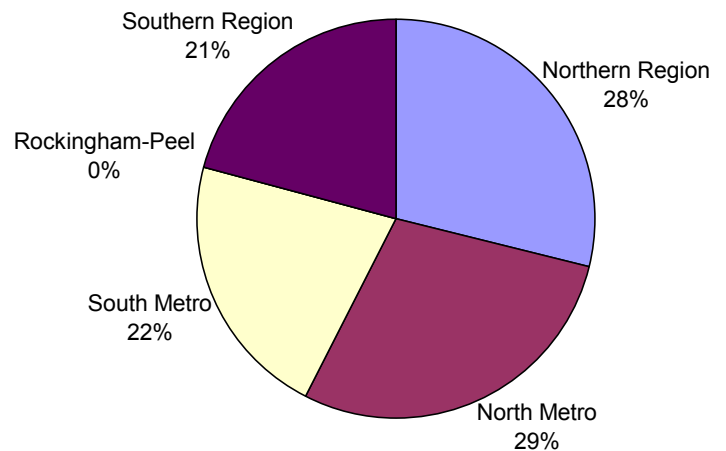
d) 26 March 2006, percentage of total sites in which birds were seen in each region.



e) 14 May 2006, percentage of total sightings in each region.

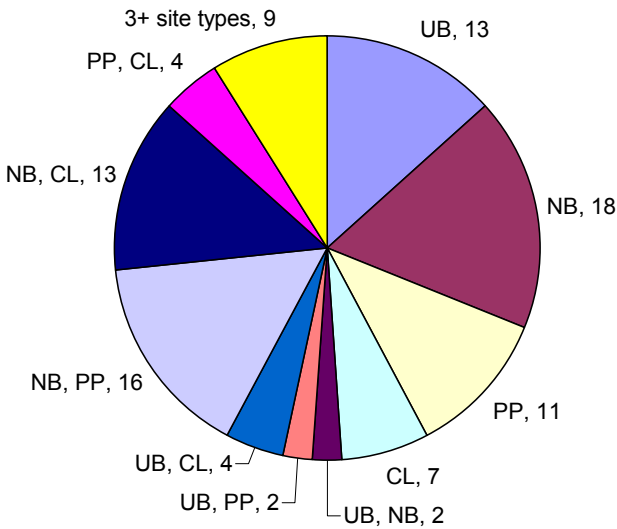


f) 14 May 2006, percentage of total sites in which birds were seen in each region.

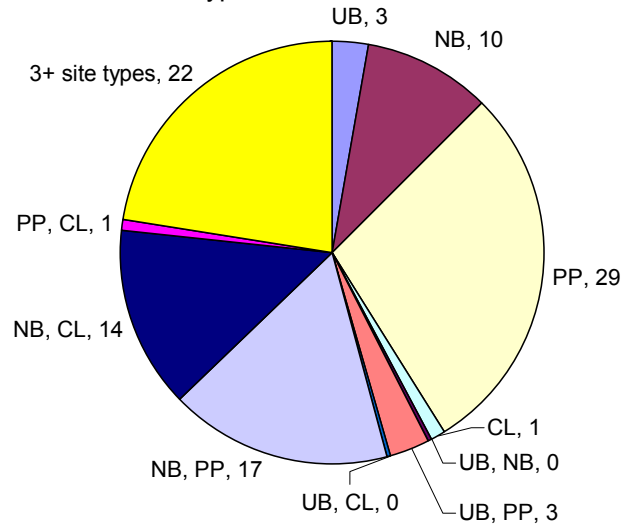


Figures 6a – f: Relative abundance of Carnaby's Cockatoos (*Calyptorhynchus latirostris*) during three surveys on 12 February, 26 March and 14 May 2006, in each of the five regions of the Swan Coastal Plain of Western Australia.

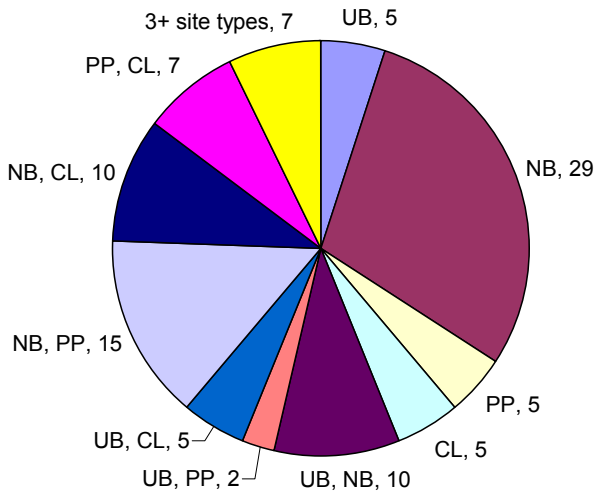
a) 12 February 2006, percentage of total observation sites of each type in which birds were



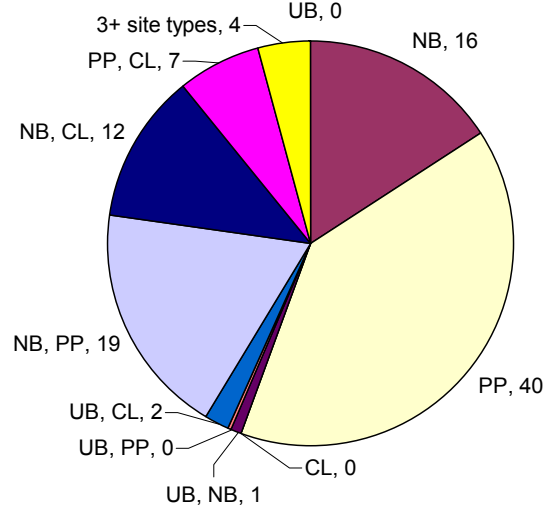
b) 12 February 2006, percentage of total birds seen in each type of site.



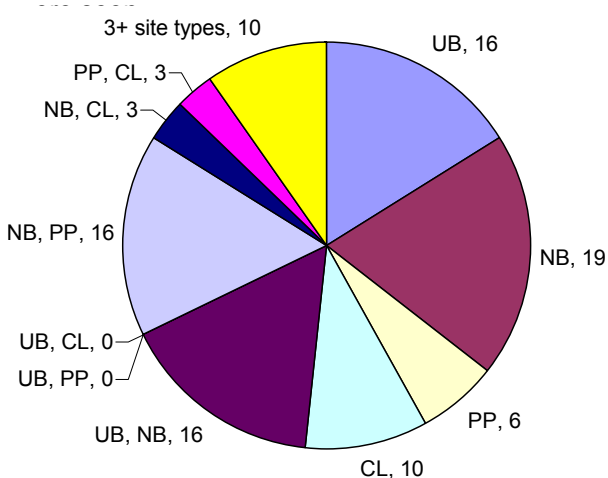
c) 26 March 2006, percentage of total observation sites of each type in which birds were seen.



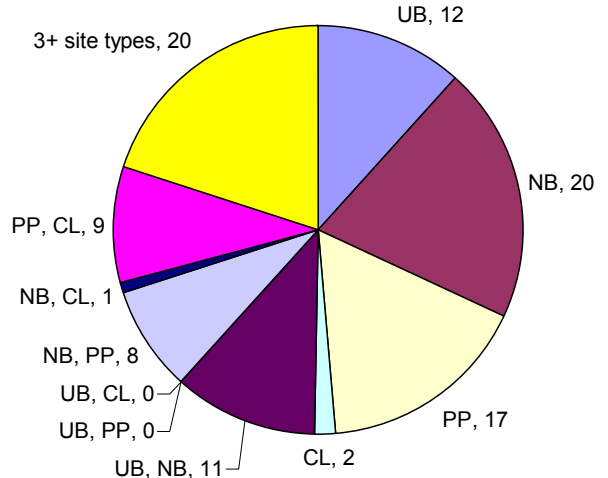
d) 26 March 2006, percentage of total birds seen in each type of site.



e) 14 May 2006, percentage of total observation sites of each type in which birds



f) 14 May 2006, percentage of total birds seen in each type of site.



Figures 7a – f: Relative abundance of Carnaby's Cockatoos (*Calyptorhynchus latirostris*) during three surveys on 12 February, 26 March and 14 May 2006, in the various site types recorded on the Swan Coastal Plain of Western Australia. [UB = Urban, NB = Natural Bush, PP = Pine Plantation, CL = Cleared].

b. Roost site use and fidelity

Identification of overnight roost sites

Overnight roost sites confirmed during the 9 April count are shown in Table 1. Of the 16 confirmed roost site trees, eight consisted of *Pinus* spp., five consisted of various species of *Eucalyptus*, two were a combination of *Pinus* spp. and *Eucalyptus* spp., whilst one was a combination of *Banksia* and *Corymbia gomphocephala* (Table 1, Fig. 8).

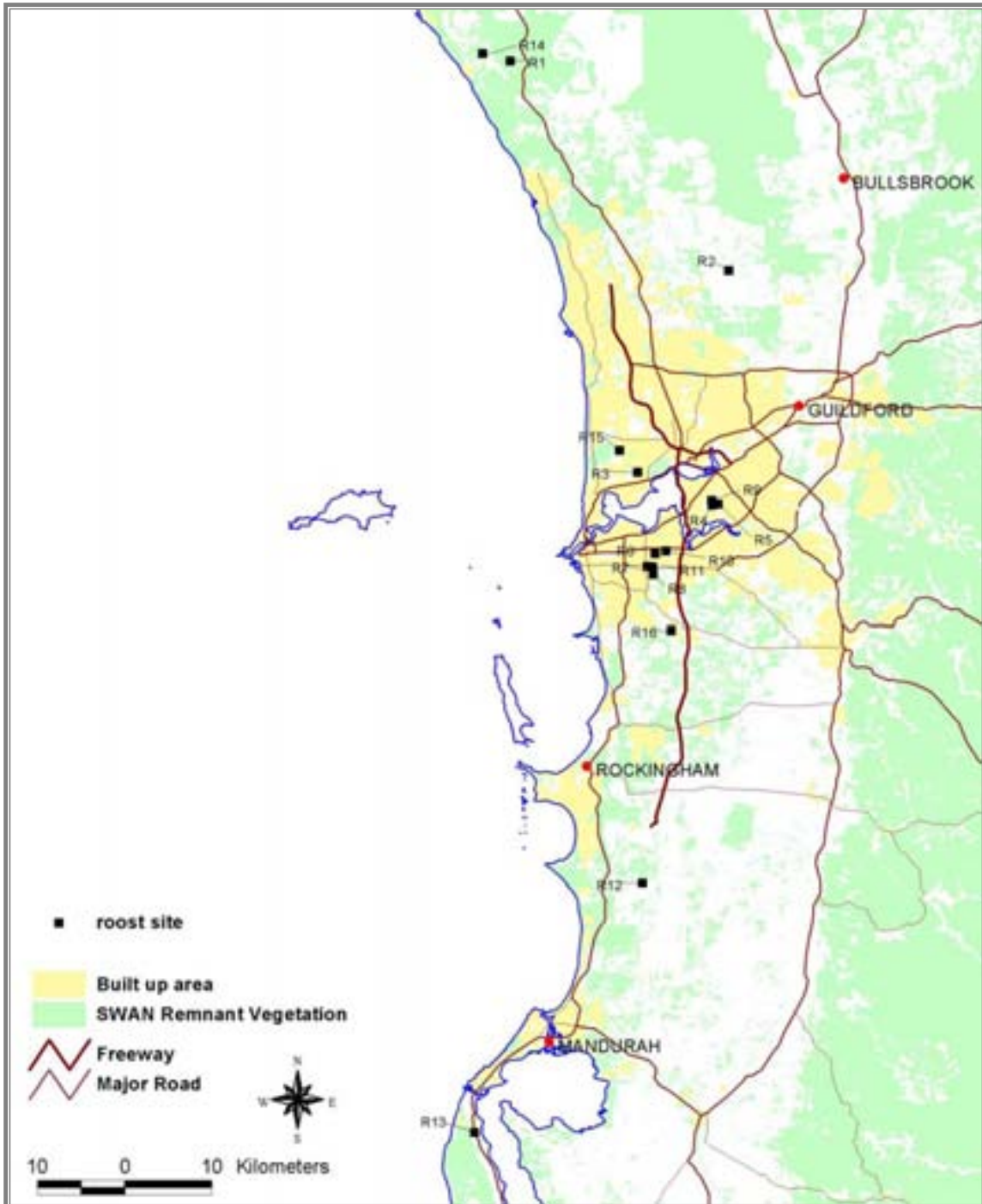


Figure 8: Map of Swan Coastal Plain of Western Australia showing Carnaby's Cockatoo (*Calyptorhynchus latirostris*) roost sites identified during the period 9 April to 14 May 2006.

Do Carnaby's Cockatoos display roost site fidelity?

Five out of six overnight roost sites showed significant variation in the numbers of birds roosting each night during the nine night survey period from 29/04/06 – 07/05/06 (Fig. 9), against the null hypothesis of an equal number of birds roosting overnight at each site ($P < 0.005$ for roost sites R2-R5 and R7; R6 was not significant at $P = 0.05$). The greatest variation occurred at Roost site 2 (Gnangara Pine Plantation) where 825 birds were counted roosting on 01/05/06 but only 90 were counted roosting four days later on 05/05/06. However, at Roost site 5 (Winthrop Park), the numbers of birds roosting over the three evenings surveyed did not vary significantly, with a maximum count of 259 and a minimum count of 215 ($P > 0.05$).

Does roost site fidelity change over time?

For the four month study site (Hollywood Hospital), the numbers of birds roosting was variable on a daily, weekly and fortnightly basis (Fig. 10). The coefficient of variation was high on both a daily (94.03) and weekly basis (92.02). The weekly and fortnightly running averages show a seasonal trend, with total number of birds roosting overnight decreasing from 29 April to 14 September 2006, and no birds observed roosting between 06 August and 14 September 2006. The number of birds roosting overnight was significantly variable, against a null hypothesis of an equal number of birds roosting overnight on a daily basis ($P < 0.001$; Fig. 10).

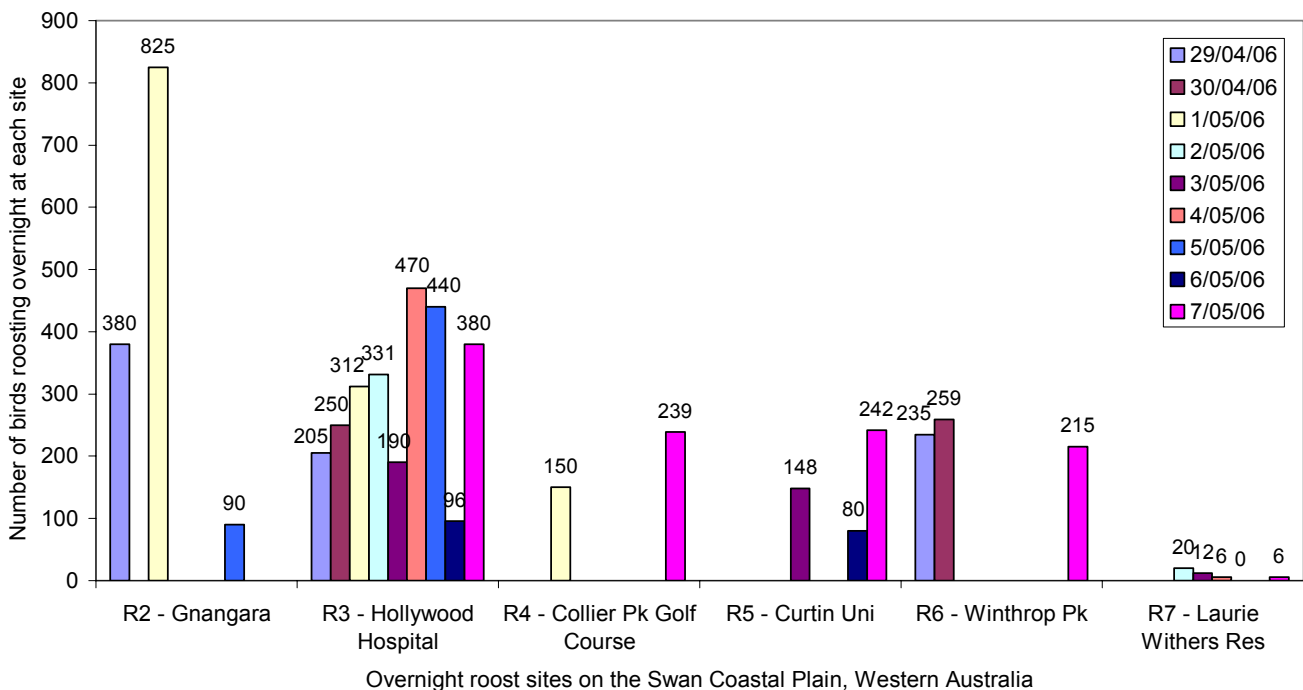


Figure 9: Numbers of Carnaby's Cockatoo (*Calyptorhynchus latirostris*) roosting at six overnight roost sites on the Swan Coastal Plain of Western Australia over a period of nine nights in April and May 2006.

Table 1: List of all confirmed roost sites for Carnaby's Cockatoo (*Calyptorhynchus latirostris*) on the Swan Coastal Plain of Western Australia.

Date	Roost Site	Vegetation/ Site description	Height (m)	Locality	Suburb	No. counted roosting
09/04/06	R1	Tall and dead <i>Eucalyptus gomphocephala</i>	15 – 20	Yanchep National Park	Yanchep	300
09/04/06	R2	<i>Pinus</i> spp.	21 – 25	Gnangara Pine Plantation	Gnangara	2489
09/04/06	R3	Tall <i>Eucalyptus citriodora</i> , <i>E. maculata</i> , <i>E. gomphocephala</i> .	<i>E. citriodora</i> : 35, <i>E. maculata</i> : 30-35, <i>E. gomphocephala</i> : 30	Hollywood Hospital	Nedlands	205
09/04/06	R4	<i>Pinus</i> spp.	10 - 15	Collier Park Golf Course	Bentley	50
09/04/06	R5	<i>Pinus</i> spp.	25 – 33	Curtin University	Bentley	70
09/04/06	R6	<i>Pinus</i> spp.	15 - 20	Winthrop Park	Winthrop	212
09/04/06	R7	Tall <i>Eucalyptus</i> spp.	10 - 15	Laurie Withers Reserve	Kardinya	92
09/04/06	R8	<i>Pinus</i> spp., <i>Eucalyptus maculata</i> and <i>E. citriodora</i>	~30	Murdoch University	Murdoch	90
09/04/06	R9	<i>Pinus</i> spp.	25 – 33	Technology Park	Kensington	225
09/04/06	R10	<i>Pinus</i> spp.	20 – 25	Piney Lakes Reserve	Winthrop	84
09/04/06	R11	<i>Pinus</i> spp. and <i>Eucalyptus</i> spp.	<i>Pinus</i> spp: 15 – 20, <i>Eucalyptus</i> spp: 12 - 15	Morris Buzacott Reserve	Kardinya	69
09/04/06	R12	<i>Pinus</i> spp.	13 – 15	Karnup Pine Plantation	Baldivis	574
09/04/06	R13	<i>Eucalyptus gomphocephala</i>	15 - 20	Bush west of Fernwood Rd	Dawesville	50
14/05/06	R14	<i>Eucalyptus gomphocephala</i>	15 - 20	Bush north and west of Moorpark Ave	Yanchep	50
14/05/06	R15	<i>Eucalyptus maculata</i>	20	Perry Lakes Reserve	Floreat	290
14/05/06	R16	<i>Pinus</i> spp.	13 – 15	Bush vicinity of Jandakot Caravan Park, Hammond Rd	Success	150

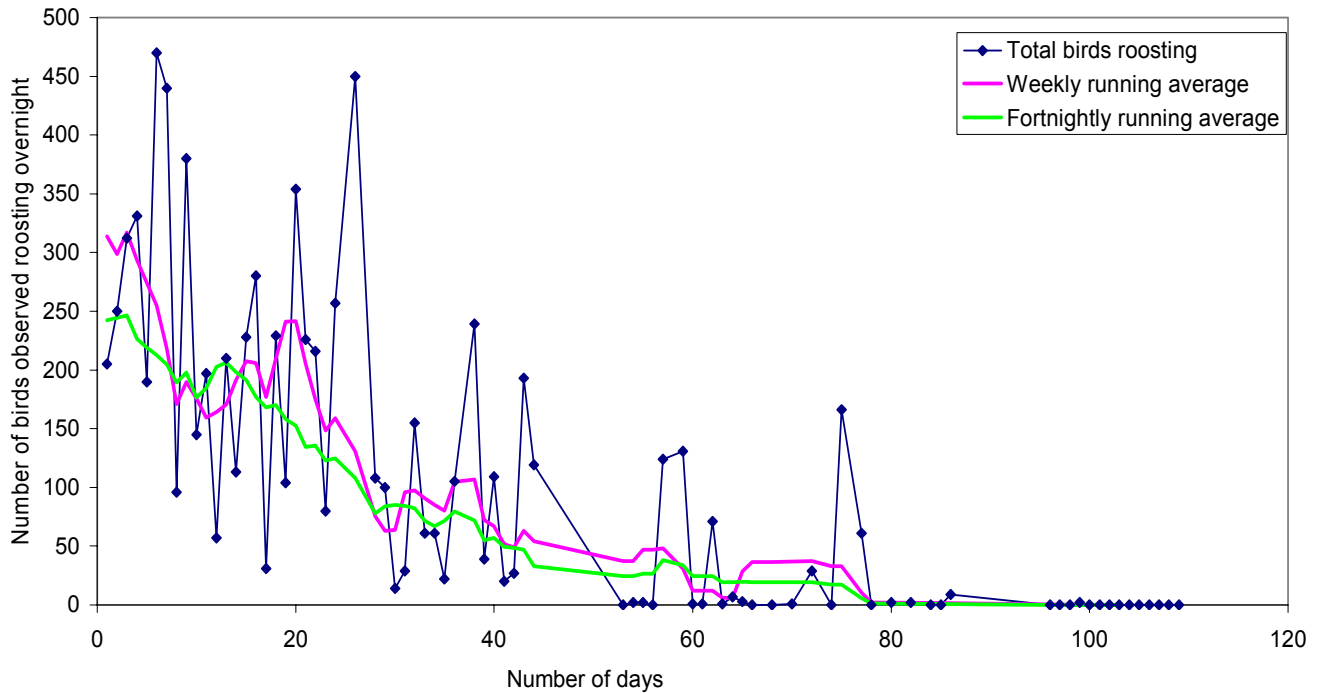


Figure 10: Numbers of Carnaby's Cockatoo (*Calyptorhynchus latirostris*) roosting at an overnight roost site (Hollywood Hospital, Nedlands) on the Swan Coastal Plain of Western Australia from 29/04/06 to 15/08/06 (no birds were observed roosting from 16/08/06 to 14/09/06).

c. Flock following – a day in the life of a Carnaby's Cockatoo flock

Carnaby's Cockatoo flocks used Gnangara Pine Plantation, Yanchep National Park and surrounding areas, which included a variety of land uses or habitat types such as paddocks, rural house blocks and freshwater lakes. Distances travelled by flocks varied from 0 to 13 km in a day, and distance travelled within an hour varied from 0 – 6.84 km/hr (Table 2). The maximum distance of 13 km was covered over 104 minutes in the afternoon, averaging 6.84 km travel per hour. By comparison, one flock observed over a 120 minute afternoon period did not move at all.

Flocks tended to move the most in the mornings and in the afternoons, usually remaining stationary around mid-day (Fig. 11). Flocks appeared to roost overnight in pine plantations, feed on seeds of pine cones in the morning, move out into the surrounding land, particularly towards Gnangara Lake to drink water, rest around mid-day and then slowly move back to the pine plantation, feeding and stopping for a drink at the Lake before returning to the pine plantation to roost overnight (Fig. 11).

The cockatoos were seen feeding on *Pinus* spp., *Eucalyptus* spp., *Banksia* spp. and *Casuarina* spp, with 9 of 15 records being of birds feeding solely on *Pinus* spp. (Table 2). One record was of birds feeding solely on *Eucalyptus* spp., two on both *Pinus* spp. and *Eucalyptus* spp., one on *Pinus* spp. and *Banksia* spp. and another on all four mentioned above.

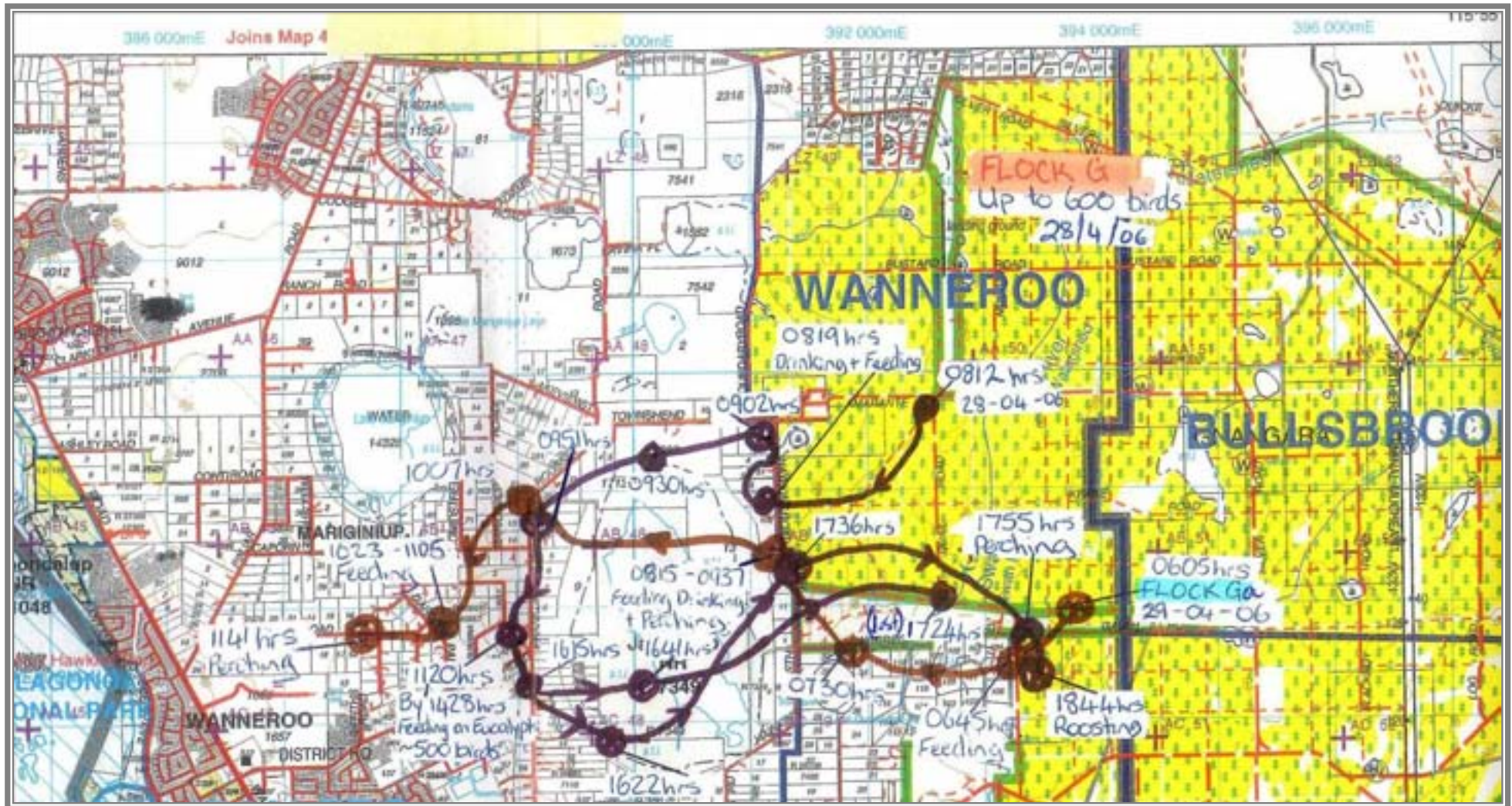
Table 2: Distance, activity and timings of Carnaby's Cockatoo (*Calyptorhynchus latirostris*) movements in the northern regions of the Swan Coastal Plain of Western Australia (Reference numbers to Figure 11 showing flight paths of flocks are provided).

Obs. period	Flock ID	Fig. No.	Date	Time period	Total time observed (hr)	Distance travelled (km)	Average speed (km/hr)	Activity
Morning	Ga	11a	29/04/2006	0605 - 1141	5.36	7.5	1.34	Feeding in <i>Pinus</i> spp., <i>Eucalyptus</i> spp. trees; drinking; towards midday, resting and no feeding
	L	11b	28/04/2006	0615 - 0815	2.00	4	2	Feeding in <i>Pinus</i> spp. trees
	Na	11c	29/04/2006	0615 - 0815	2.00	4	2	Feeding in <i>Pinus</i> spp. trees; flocks fragmenting and re-joining
	H	11b	28/04/2006	0615 - 0830	2.15	5	2.22	Feeding in <i>Pinus</i> spp. trees
	B	11d	21/04/2006	0700 - 0820	1.20	6.5	4.87	Feeding in <i>Pinus</i> spp. and <i>Banksia</i> trees; drinking
	Ka	11h	29/04/06	0615 - 0830	2.15	9.5	4.22	Feeding in <i>Pinus</i> spp. trees; drinking
	A	11e	21/04/2006	0700 - 0830	1.30	4	2.67	Feeding in <i>Pinus</i> spp. trees
	O	11f	29/04/2006	0702 - 0915	2.13	6	2.7	Feeding in <i>Pinus</i> spp. trees
	I	11e	28/04/2006	1000 - 1300	3.00	0.5	0.17	Resting; feeding in <i>Eucalyptus</i> spp. (white gums)
Afternoon	E	11g	21/04/2006	1601 - 1701	1.00	0.5	0.5	Drinking in water troughs
	D	11h	21/04/2006	1620 - 1715	0.55	0.75	0.82	Not noted
	F	11d	21/04/2006	1600 - 1800	2.00	0	0	Feeding in <i>Pinus</i> spp. trees
	K	11e	28/04/2006	1621 - 1815	1.54	13	6.84	Feeding in <i>Pinus</i> spp. trees
	N	11c	28/04/2006	1650 - 1830	1.40	5	3	Feeding in <i>Pinus</i> spp. trees
All Day	G	11a	28/04/2006	0812 - 1844	10.32	9	0.85	Drinking; feeding in <i>Eucalyptus</i> spp. and <i>Pinus</i> spp. trees; midday, very quiet, little movement and no feeding; afternoon, active feeding
	C	11c	21/04/2006	0820, 1045 - 1718	6.33	11	1.68	Resting, feeding in <i>Pinus</i> spp., <i>Banksia</i> spp., <i>Casuarina</i> spp. and <i>Eucalyptus marginata</i> trees; remain in areas for long periods, particularly during midday
	M	11f	28/04/2006	0940 - 1815	8.35	6.5	0.75	Feeding in <i>Pinus</i> spp.; <i>Banksia</i> spp. and <i>Eucalyptus</i> spp. trees; resting

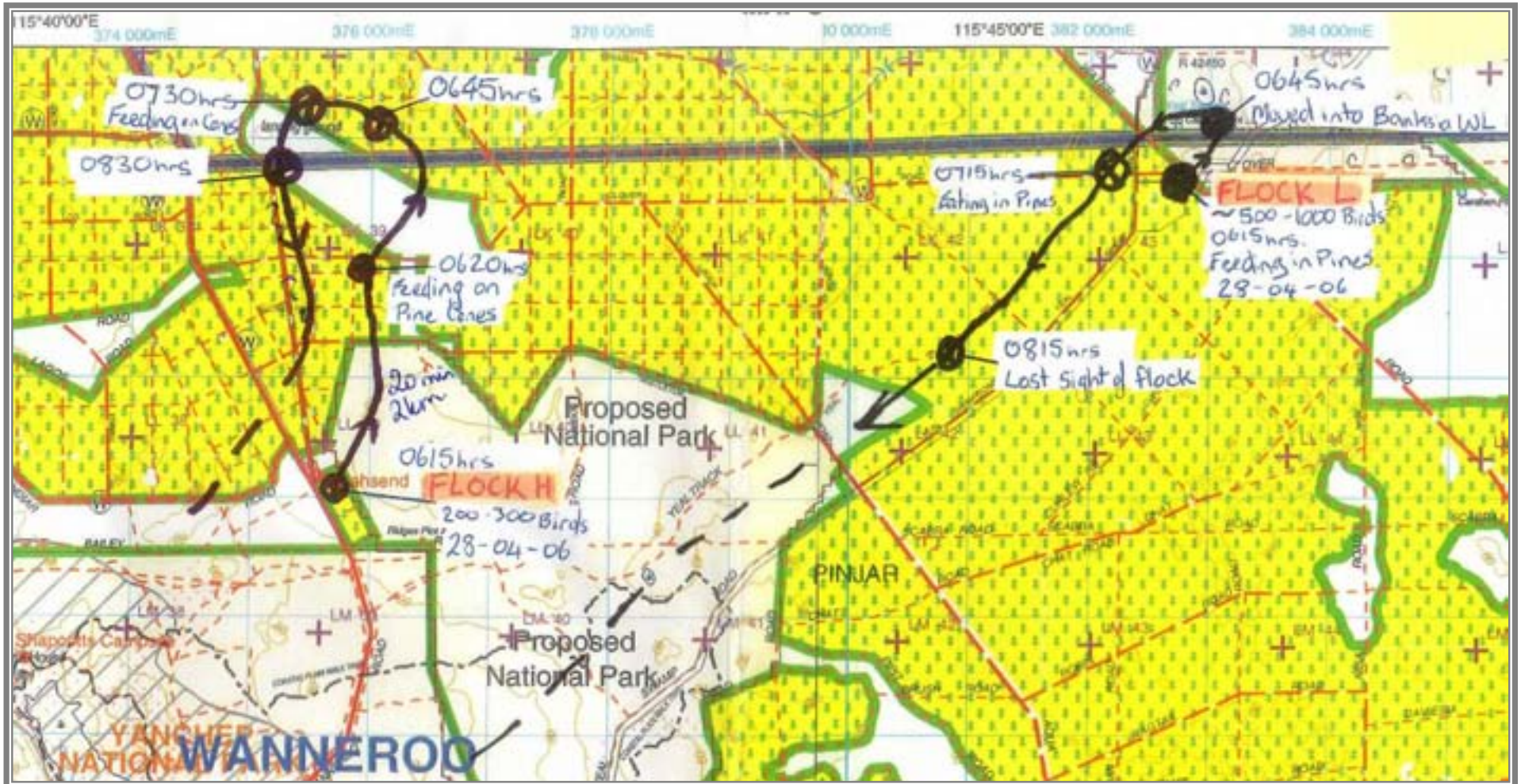
Figure 11

Flight paths taken by flocks of Carnaby's cockatoo (*Calyptorhynchus latirostris*) in the northern regions of the Swan Coastal Plain of Western Australia on 3 days in April (21st, 28th, 29th) 2006.

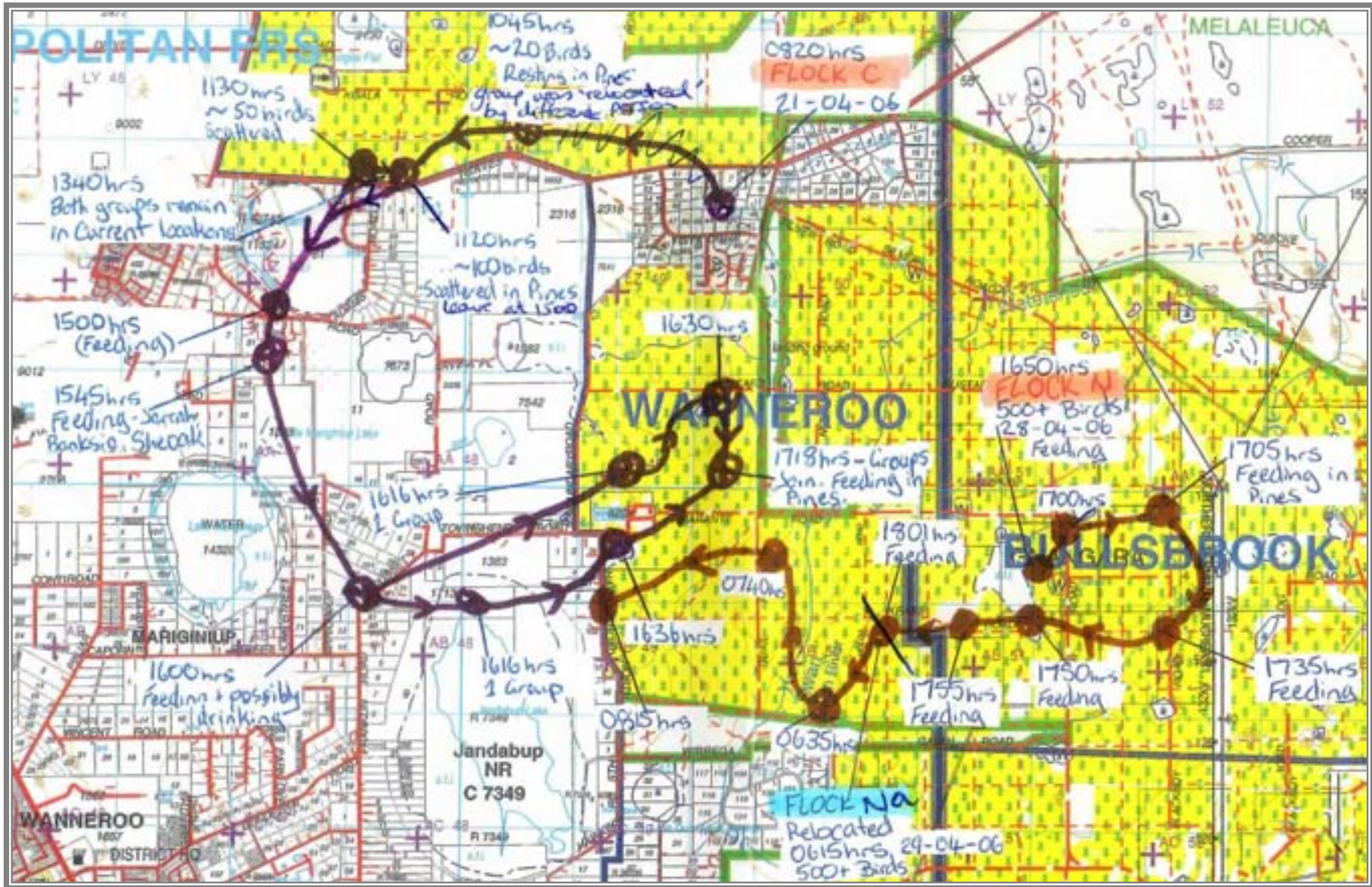
a) Flock Ga (29/4/06, morning, 0605 - 1141) and Flock G (28/4/06, all day, 0812 - 1844).



b) Flock L (28/4/06, morning, 0615 - 0815) and Flock H (28/4/06, morning, 0615 - 0830).



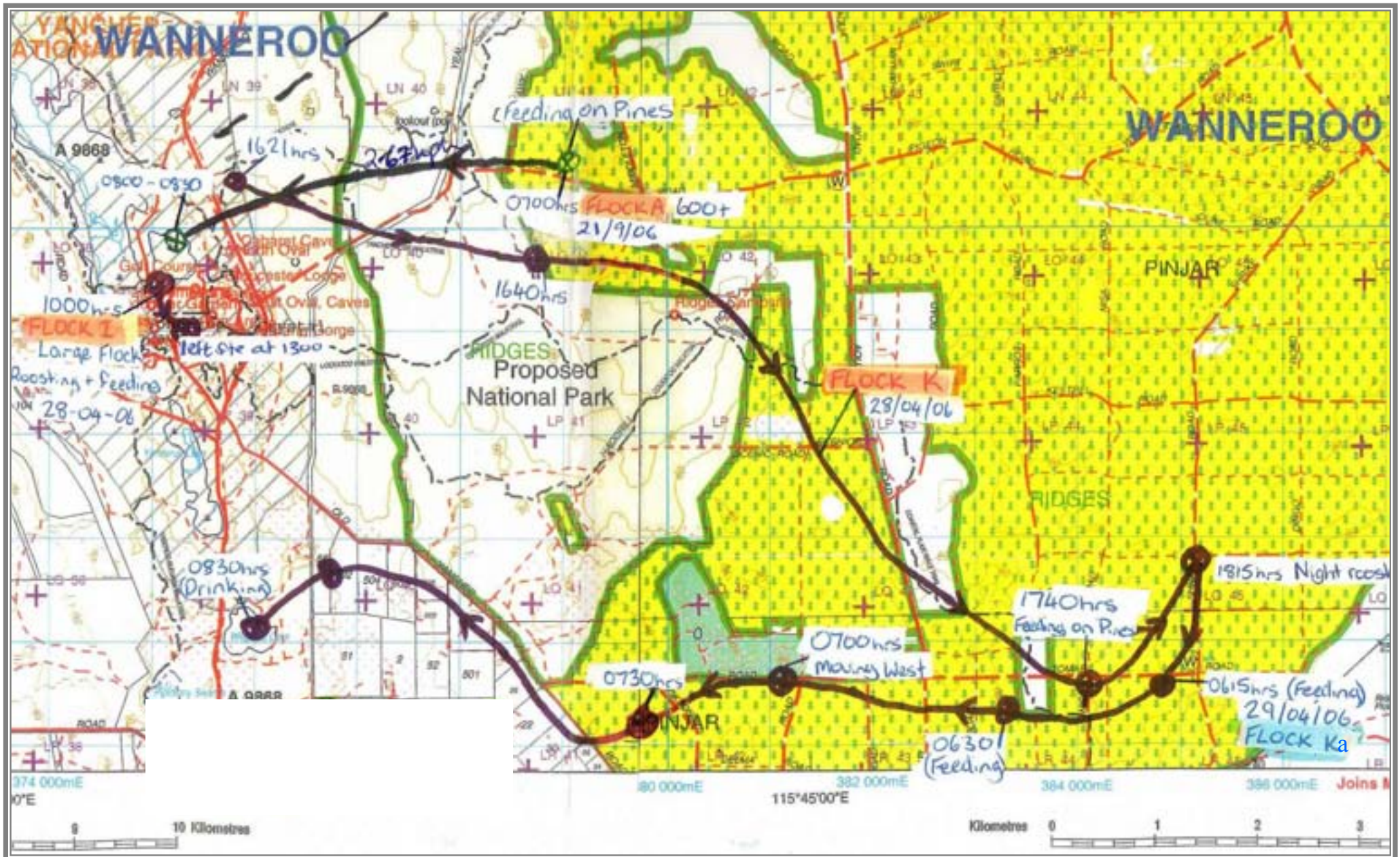
c) Flock Na (29/4/06, morning, 0615 - 0815), Flock N (28/4/06, afternoon, 1650 - 1830) and Flock C (21/4/06, all day, 0820, 1045 - 1718).



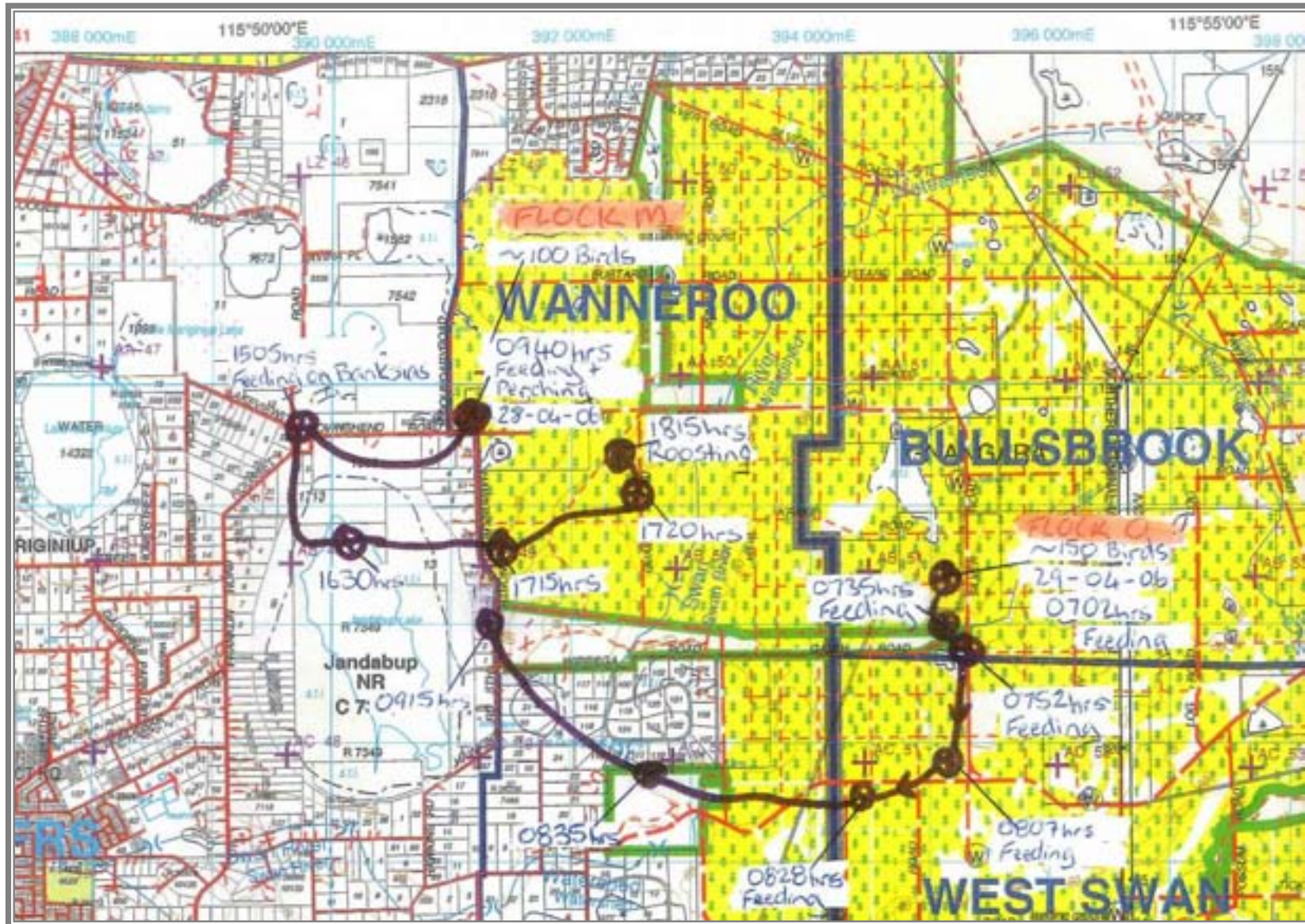
d) Flock B (21/4/06, morning, 0700 - 0820) and Flock F (21/4/06, afternoon, 1600 - 1800).



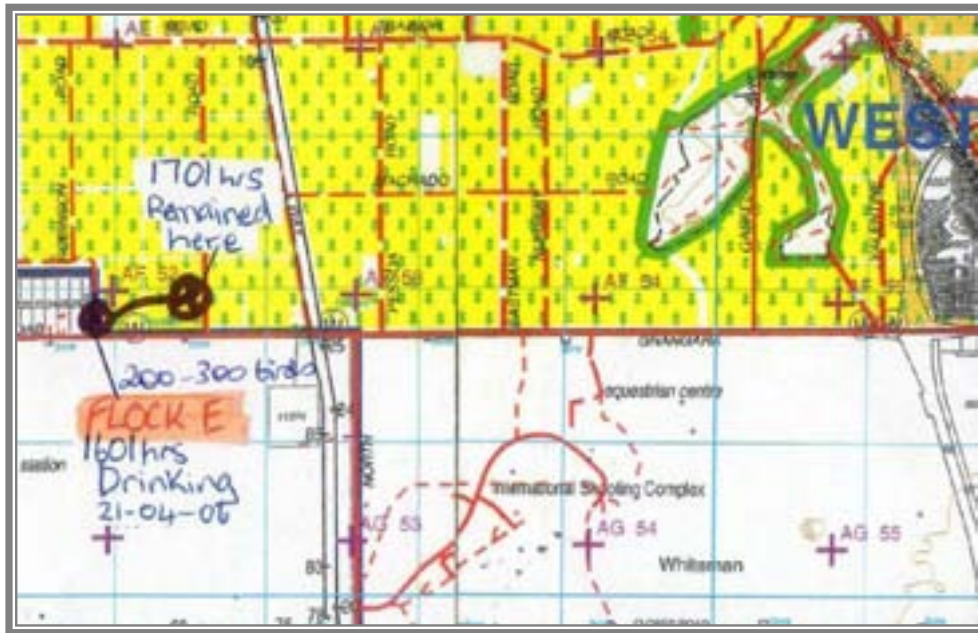
e) Flock A (21/4/06, morning, 0700 - 0830), Flock I (28/4/06, morning, 1000 - 1300), and Flock Ka (29/4/06, morning, 0615 - 0830).



f) Flock O (29/4/06, morning, 0702 - 0915) and Flock M (28/4/06, all day, 0940 - 1815).



g) Flock E (21/4/06, afternoon, 1601 - 1701).



h) Flock D (21/4/06, afternoon, 1620 - 1800).



d. Food plant species used by Carnaby's Cockatoo

Carnaby's Cockatoos were recorded feeding on a range of plant species; 24 native species and nine non-native species. Seven of the native species were Banksias, five Eucalypts and three Hakeas (Table 3). *Banksia* spp. accounted for 24/ 49 native species records, *Corymbia* spp. accounted for 8/49 and *Eucalyptus* spp. accounted for 6/ 49 records. *Pinus* spp. dominated the non-native species records at 20/ 27, with *Macadamia integrifolia* accounting for 3/ 27 records.

Table 3: Plant species on which Carnaby's Cockatoos (*Calyptorhynchus latirostris*) were recorded feeding, including date, time and the number of birds seen feeding.

Plant scientific name	Plant common name	Part of plant being eaten	Date seen	Time seen	No. birds
NATIVE AUSTRALIAN PLANTS					
<i>Acacia saligna</i>	Orange Wattle	fresh bark	12/06/2006	930	7
<i>Agonis flexuosa</i>	Peppermint tree	bark/ grubs	11/05/2006		25
		bark	15/06/2006	1430	6
		bark/ grubs	2/07/2006		18
<i>Banksia attenuata</i>	Candlestick Banksia	seeds, possibly grubs	2/02/2006	1630	50
		seeds out of old fruits	2/03/2006	1410	17
		nuts	5/06/2006	1715	3
<i>Banksia attenuata</i> , <i>B. ilicifolia</i>	Candlestick Banksia, Holly Banksia	fruit cones	30/05/2006	1720	120+
<i>Banksia attenuata</i> , <i>B. menziesii</i>	Candlestick Banksia, Firewood Banksia	flowers & seeds	12/04/2006	1000	20-30
<i>Banksia ericifolia</i>	Coastal Heath Banksia		16/07/2006	1700	150-200
<i>Banksia ilicifolia</i>	Holly Banksia	fruit	23/11/2005	1815	5
		mature cones	9/12/2005		5
		fruits	23/05/2006	1320	40
<i>Banksia longifolia</i>	Tree Banksia	nuts	24/06/2006	1230	12
<i>Banksia menziesii</i>	Firewood Banksia		22/04/2006	1240	400
		flowers, seeds, nuts	5/05/2006	1415	12
		flowers, seeds & nuts	17/05/2006	1400	15
		flowers	11/06/2006	930	185
<i>Banksia menziesii</i> & <i>Banksia ilicifolia</i>	Firewood Banksia & Holly Banksia	seeds and cones	20/08/2006		15-20
<i>Banksia prionotes</i>	Acorn Banksia	mature cones (dry)	9/12/2005		5
		mature cones	20/12/2005		21
		mature cones	4/02/2006		7
<i>Banksia</i> spp., maybe <i>B. grandis</i>	Bull Banksia	seeds, maybe flowers	12/02/2006		250
<i>Banksia</i> spp.	Banksia		12/07/2006		6
			16/07/2006	1600	5
<i>Callistemon</i> spp.	Bottle brush	old seeds	11/12/2005	1000	16
<i>Corymbia callophylla</i>	Marri tree	nuts	27/12/2005	830	2
		nuts, under bark	24/06/2006	1230	
		fruit	12/03/2006	1230	39
<i>Corymbia callophylla</i> , <i>Eucalyptus marginata</i>	Marri & Jarrah trees	fruit	25/11/2005	1040	15
		fruit	5/04/2006	1200	190
<i>Corymbia ficifolia</i>	Red flowering gum	closed flowers	15/04/2006		6
		flowers	12/02/2006		62

Plant scientific name	Plant common name	Part of plant being eaten	Date seen	Time seen	No. birds
<i>Dryandra sessilis</i>	Parrot Bush	late flowers/mature seed	24/12/2005		30+
<i>Eucalyptus citriodora</i>	Lemon-scented gum	nuts, seeds, flowers	10/05/2006	1505	20
<i>Eucalyptus gomphocephalla</i> , <i>Banksia menziesii</i>	Tuart tree, Firewood Banksia	tuart blossoms, developing flower spike	22/04/2006	1220	50
<i>Eucalyptus salmonophloia</i>	Salmon gum	nuts, seeds	8/05/2006	1530	15
<i>Eucalyptus</i> spp.	Eucalyptus tree	nuts and any new shoots	21/04/2006	620	65
<i>Ficus</i> spp.	Fig tree	Fruit	20/02/2006	835	20
<i>Hakea laurina</i>	Pin-cushion Hakea		12/06/2006	1030	6
		flowers & seeds	12/06/2006		6
		seeds	12/06/2006		6
<i>Xanthorrhoea preissii</i> , <i>Eucalyptus salmonophloia</i>	Grass tree, salmon gums	seeds, flowers	15/05/2006	1600	25
NON NATIVE/ EXOTIC PLANTS					
<i>Helianthus annuus</i>	Sunflower plants	immature sunflower seeds	12/04/2006		45
<i>Hibiscus</i> spp.	Hibiscus garden variety	flowers or nectar	1/11/2005	730	8
<i>Jacaranda mimosifolia</i>	Jacaranda tree	seed pods (last year's)	23/12/2005		9
<i>Macadamia integrifolia</i>	Macadamia nut tree		30/04/2006	a.m. & late p.m.	15
		nuts	10/06/2006		60
		nuts	30/07/2006		100- 150
<i>Pinus</i> spp., <i>Eucalyptus</i> spp.	Pine & gum trees	nuts	3/04/2006		40-50
<i>Pinus</i> spp.	Pine tree		11/12/2005	1830	16
		cones	14/12/2005	1250	26
		nut/seed	20/12/2005		30
		nuts	31/12/2005		30
		feeding on small green pine cones	6/01/2006	1840	60
		seed from cone	23/01/2006	1530	50
		seed from cone	2/02/2006	1600	50
		nuts, striping of pine needles	10/02/2006		4
		pine cones/ seeds	17/02/2006		8
		pine cones	21/02/2006	mid day	3
		pine cones	22/02/2006	mid day	3
		pine cones	23/02/2006	mid day	6
		pine nuts	25/02/2006	715	60
		fruit cones, still green and 4 - 6 cm wide	2/03/2006	1410	100
		nuts/cones	26/03/2006		30+
		pine cones	28/03/2006	mid day	10
		nuts	12/04/2006		8
	16/07/2006	1645	10		
		1640	15		
<i>Prunus amygdalus</i>	Almond tree	unripe almonds	1/01/2006		10

Due to the requirement for large numbers of volunteer observers, public relations exercises were an important part of the project. Brief details are provided below of the project's popular publications and publicity, volunteer participation and direct resultant community activity.

e. Popular publications & publicity

- i. A new **website** was created to promote the project & enable easier volunteer management:
www.CarnabysCockatoo.org
- ii. A number of **newspapers** featured articles based on press releases about the area count (see **Appendix 6** for examples). This enabled recruitment of the large numbers of volunteers required. These include:

Newspapers & magazines	Electronic Newsletters	Radio Interviews
Bunbury Herald	BAWA all members email	ABC (720AM)
Bunbury Mail	CALM all staff email	ABC (southwest)
Conservation News, CALM	Conservation Council	RTR FM – Understorey
Fremantle Herald	Environmental Educators Network	RTR FM – afternoon show
Hills Gazette	Friends of Yellagonga newsletter	6 PR 882AM
Joondalup Times	NARNEWS	
Melville Times	UWA EnviroGuild	
Stirling Times	Whiteman Park Staff email newsletter	
The Canning Times	WWF	
The Examiner	Yanchep NP volunteers	
The Post		
The Sunday Times		
The Western Suburbs Weekly		
Wanneroo Times		
Waroona Harvey Reporter		

- iii. Informative **articles** have been written for community publications (see **Appendix 7** for all available) and a number of these are listed below:

Publication	Organisation	Number of articles
Bird Notes	Birds Australia WA	3
Ecoplan News	CALM	2
Greener Times	Conservation Council	1
The Web (Threatened Species Network)	WWF	1
Cocky Notes	Carnaby's Cockatoo Recovery Project, Birds Australia WA	2

- iv. A number of **presentations** have been made to academic, general public and student audiences (see **Appendix 8** for Congress abstract). These are listed below:

Presentation	Audience	Location
Carnaby's Cockatoo: a species in crisis	General public and volunteers	Yanchep National Park
Carnaby's Cockatoo: a species in crisis	University of Western Australia, Conservation Biology students	WA Ecology Centre, Floreat
Carnaby's Black-Cockatoo: A year on the Swan Coastal Plain.	General public and volunteers	WA Ecology Centre, Floreat
Carnaby's Cockatoo on the Swan Coastal Plain	Birds Australia Congress 2006	Albany

f. Volunteer participation

Approximately 450 volunteers were listed on the register, however more than twice that number people actually participated in counts and other activities (families, partners, etc of volunteers). A summary of participation and approximate volunteer hours is listed below. It is estimated that a further 909 hours have been spent by volunteers travelling to and from sites or to the Birds Australia office in Floreat.

Activity	No of volunteers	Number of hours
Area count – 4 Dec 05	126	363
Area count – 12 Feb 06	428	1029
Area count – 26 March 06	273	628
Area count – 14 May 06	186	423
Roost-site id & count – 9 April	26	42
Roost-site fidelity study	5	~103
Transect search & count	14	~72
Data management & mail-outs	8	~129
Volunteer Coordinators	12	212
SUB - TOTAL	1078	3001
Total travel time		909
TOTAL	1078	3910

3001 volunteer hours + 909 hours volunteer travel = 3910 total volunteer hours.
This is the equivalent of approximately 2 years of a full-time Field Officer.

g. Community activity resulting from the project

This project has resulted in significant public interest, with many enquiries from community members wishing to save local bushland (e.g. AK Reserve). In addition, enquiries were also received from corporate bodies wishing to develop land that is potentially important for Carnaby's Cockatoos (e.g. pine trees at Murdoch University).

Some of the volunteers that have been involved with the project have now taken actions to help protect existing sites used by Carnaby's, or to replant sites with plant species used by Carnaby's as food.

- i. Friends of Yellagonga - planting ~2000m² Carnaby's food species at Yellagonga Regional Park.
- ii. AK Reserve – noted as roosting site; to be taken into account in Perry Lakes Redevelopment plans
- iii. Great Gardens Workshops – these are conducted throughout Perth & in regional areas. These now provide information about Carnaby's Cockatoo and appropriate food & nesting plant species, as well as instructions on how and where to grow these.
- iv. Paintings by artists for display/ exhibition, for example Sue Kalab of Bunbury.

5. Discussion – assessment of strengths & limitations of methods

a. Population estimates and relative abundance.

Three separate methods for obtaining a population estimate were trialled – their individual strengths, limitations and assessment of their relative merits are discussed below.

Area Count Method

Strengths

- Minimum population estimate for Carnaby's Cockatoo on the SCP was obtained.
- Relative abundance of cockatoos on various parts of the SCP obtained, based on region and on habitat type.
- A range of publicity exercises were conducted to encourage volunteer participation. As a by-product, a significant amount of awareness-raising was achieved via newspaper, magazine and newsletter articles, as well as radio interviews (see 7a).
- The 'Great Cocky Counts' required input from a large number of volunteers and thus involved both the Birds Australia WA membership and the general public.
- The study shows that use of volunteers in collecting data is effective – the study would not have been possible without volunteer participation, with over 1000 people participating in the surveys.

Limitations

- Enormous logistical exercise recruiting, coordinating and using such large numbers of volunteers.
- Difficulty with volunteers not following or understanding instructions – group or one-on-one training in methodology would be beneficial but would require a great deal of time.
- High variability in the length of time volunteers conducted surveys.
- High variability in counting abilities of volunteers.
- Carnaby's Cockatoos are highly mobile, and fly the greatest distances in the early morning and late afternoon (see flock following exercise below). As a result, observation periods for population estimation had to be shortened to 10-minute blocks to reduce the possibility of double counting.
- Population estimates cannot be extrapolated to areas that were not surveyed because the birds occur in large flocks and are patchily distributed over a variable landscape.
- This method ideally requires thousands of volunteers to obtain sufficient coverage for population estimation. However, this would require a greater amount of publicity, more time, and several people working on the project who could handle the large volume of calls and data.

Roost Count Method

Strengths

- A number of roost sites on the SCP have been determined.
- A minimum population estimate has been obtained.
- Relatively small number of volunteers required, and therefore much easier logistically.
- This method is ideal for obtaining a minimum population estimate as the birds appear to settle down at their roost site soon after sunset, thus reducing problems of double-counting.
- This assumes that all or most of their roost sites are known.

Limitations

- Counting primarily black birds against tall trees with dark foliage and in failing light proved to be a difficult task – some thought is required to determine best count method, and may include use of night-vision glasses.
- Birds move around considerably from tree to tree within the roost area for some time before settling down, often after sunset. This made counting difficult for observers.

- Whilst it may be possible to determine many of their roost sites in metropolitan areas, this is much more difficult in larger areas of bush or in pine plantations.
- May be difficult or impossible to find all known roost sites.
- The birds do not always roost in the same location each night (see roost site fidelity study below).
- Birds may move away under cover of darkness, although this may not present a problem for a population estimate because counts are made within 5 minutes of each other.

Transect Count Method

Strengths

- A potentially good method for intensive searching of an area with good road access, and ideal for birds that do not move large distances.
- If flocks are located, it would be a good method for determining where birds are feeding and on what.

Limitations

- Few Carnaby's Cockatoos were found using this method.
- Carnaby's Cockatoos appear to begin feeding earlier than 7.30am when this search began, probably beginning at or before dawn.
- The cockatoos are both highly mobile and patchily distributed. As a result, the chance of finding a flock is likely to be fairly small.
- This method can be used in areas such as Gnangara Pine Plantation where a good network of roads exists, with little public traffic. It would not be feasible in highly built-up areas due to traffic, or in rural areas with large private properties, access to which would require individual permission from land holders.

Method assessment and comparison

- Estimating the population of such a highly mobile and patchily-distributed bird species presents significant problems and thus needs very careful consideration. Any count obtained is only valid for that particular day – numbers fluctuate considerably and many counts would need to be conducted over a number of years to obtain a more reliable estimate.
- The area count and roost count methods were both successful at obtaining a minimum population estimate. Due to the patchy distribution of Carnaby's Cockatoos, the transect count did not yield a population estimate.
- **The roost count method was effective for population estimation** due to the ability to obtain a final count of cockatoos at their overnight roost sites, and the limited chance of double-counting. It was also much easier logistically than the area count, requiring less volunteers, coordination, and therefore time. Night vision glasses may be a good method of eliminating issues with black birds in tall dark trees.
- The roost count method also confirmed roost site reports and highlighted the potential significance of these sites for Carnaby's Cockatoos.
- **The area count was effective in providing a picture of the relative abundance** of Carnaby's Cockatoos by region and by habitat – and thus of potentially important/ critical habitat.
- The area count was also highly successful in attracting media attention, engaging the general public and creating interest in the plight of the cockatoo and results of habitat destruction.
- The transect search was not effective for population estimate but may be a good method for finding flocks at dawn, at which time a count may be made to determine flock sizes. These would need to be repeated a number of times to determine whether the sizes are constant.

b. Roost site use and fidelity.

The strengths, limitations and merits of this method for determining roost site fidelity are discussed below.

Strengths

- This was an excellent method for determining roost site fidelity.
- Relatively small number of volunteers required.
- Counts from the same site were conducted by the same volunteer, enabling reliable comparison between days.
- One particular volunteer obtained counts from 29 April to 14 September, enabling its use as a longer-term case study.

Limitations

- Similar difficulties with counting as detailed above.
- Some difficulty in recruiting volunteers for the week-long study.
- Difficulty also with obtaining count data for all 9 nights during the survey period.
- This study was unable to answer the question of what Carnaby's Cockatoos may perceive as a roost site – e.g. a roost site may be a large area of 20km² that we have defined as separate sites in this study.

Assessment

- **This was a good method for showing whether or not Carnaby's Cockatoos were loyal to roost sites as defined in this study.**
- The method identified what species of trees were used for roosting, which assists in understanding whether there was a difference between these and the surrounding trees.
- The study only incorporated a handful of roost sites that have been reported within a short time period – we expect that there are many more currently unknown roost sites, particularly in areas not frequented by people.
- Patterns of movement related to food availability throughout the year probably influence roost site use and fidelity.

c. Flock following – a day in the life of a Carnaby's Cockatoo flock.

The strengths, limitations and merits of this method for determining daily movement and activity patterns, and food plant species used, are discussed below.

Strengths

- This is an excellent method for understanding the broad daily movement patterns of Carnaby's Cockatoos.
- The method also provided an overview of activity patterns throughout the day.
- Dispersal capacity and speed of travel of Carnaby's Cockatoo determined.
- The method also enabled identification of some food plant species.

Limitations

- **Movement patterns are likely only relevant to particular flocks at particular times of the year.**
- Patterns found in the northern parks are likely to be significantly different to those within the metropolitan area where food availability is variable and flocks may need to fragment in search of food.
- In this study, flocks were not followed from dawn to dusk, potentially missing important movements or activities.

- There may be some difficulty in being certain when a flock is "lost" whether the new flock "found" is the same one.

Assessment

- This method was useful in enabling a broad understanding of the movement patterns of Carnaby's Cockatoo during the non-breeding season on the SCP.
- The study was an excellent method for determining speed of travel of Carnaby's Cockatoo throughout the day, including variation in speed at different times of day – this speed was able to be used in the area count population estimate above.
- An improved methodology could involve finding several flocks and individually tracking them over a period of time/seasons from at least an hour before dawn to an hour after dark.
- The results from this study are probably only useful for other areas with similar land uses – movement patterns are likely to be different in built up areas.

d. Food plant species used by Carnaby's Cockatoo

The strengths, limitations and merits of this method for determining Carnaby's Cockatoo food plant species are discussed below.

Strengths

- A relatively easy task that could be completed by any interested person during the course of a normal day.
- Obtained specific records of feeding birds and food plant species.
- If large flocks are discovered feeding in an area, these areas can then be added to the list of sites "used" by Carnaby's Cockatoos, which can be investigated further via vegetation composition surveys.

Limitations

- Most volunteers do not know plant names to species level and some were also unable to determine genus.
- Without active coordination, the response by volunteers was limited.

Assessment

- This method was successful in confirming the list of plant species on which Carnaby's Cockatoos feed on the Swan Coastal Plain.
- Unfortunately, in the absence of identified plant survey dates, volunteers generally lacked the motivation to complete the exercise.

6. General Discussion

The minimum Carnaby's Cockatoo population estimate on the Swan Coastal Plain was 4,510 birds, obtained by a roost count on 9 April 2006. The minimum population estimate obtained via area counts over 10 minute blocks was 2,633 on 26 March 2006, suggesting that counting at roost sites is a preferable method. Anecdotal accounts of flocks of birds are periodically reported to Birds Australia via the Carnaby's Black-Cockatoo Recovery Project and the Birds Australia Bird Atlas, and to the WA Museum/ Water Corporation. Some anecdotal counts are relatively high, however this report cannot make any predictions regarding their accuracy.

Carnaby's Cockatoos occurred in all regions and in all types of habitat throughout the Swan Coastal Plain in at least one of the three surveys, with an apparent seasonal peak in total numbers in March. The Northern Region appears to be an important area throughout the season, whereas the highly urbanised North Metro area appears to increase in use from February to May.

Large proportions of sites with birds were in areas with natural bush and combinations of other land uses throughout the season. Conversely, the proportion of birds using pine plantations appeared to peak during March. Carnaby's Cockatoos are known to exploit the rich and densely packed food source provided by mature cones of the introduced pine trees. Most of these pine plantations are ear-marked for progressive removal over the next 20 years, posing a significant conservation issue for Carnaby's Cockatoos. Only small proportions of sites with birds were in urban and cleared areas, with relatively small proportions of birds occurring here.

Varying numbers of Carnaby's Cockatoos returned to identified roost sites each night. The longer-term case study confirms that the roost site was used over a number of months during the 2006 non-breeding season. Anecdotal evidence suggests that birds return to the same roost sites from year to year. The variation in numbers on a nightly basis may be a result of several factors. A cockatoo may not differentiate between roost sites 500 m or 1 km apart – little is known about how these birds use and perceive the landscape. Movement patterns indicated by roost counts within the highly modified South Metro region suggest that birds disperse throughout the landscape, and this is likely to be in search of food. In comparison, the flock-following exercise conducted in the food-rich Northern Region suggests that birds follow a similar movement pattern each day, returning to the same area to roost each night.

All the studies showed that Carnaby's Cockatoos used native vegetation and significantly, pine plantations, to a great extent. A higher number and greater abundance of birds occurred in areas with native vegetation and pine plantations during area counts, with the largest counts being in pine plantations. Eight of the 16 identified roost sites consisted of pine trees, five were Eucalypts and two sites were combined pine and Eucalypt. Observers reported that the birds appeared to prefer taller trees and trees with denser canopies (P. Berry, pers. comm.). Flocks followed in the Northern Region spent a great deal of time feeding in pine plantations and also roosted in them. Banksia species accounted for more than half of all native plant feeding records whilst pine plantations accounted for almost 75% of all non-native feeding records.

Clearly, whilst pine plantations play a significant role in the ecology of Carnaby's Cockatoos on the Swan Coastal Plain, so do native species such as Banksia and Eucalypts. It is likely that

as native species have been replaced by urban development with little vegetation and large, pine plantations, Carnaby's Cockatoos have had to search for new food sources such as pine cones. The food-rich pine plantations are likely to have assisted the survival of the birds during urban development. However, the current land-clearing for further urban development and the planned removal of the plantations over the next 20 years is likely to have a significant impact on Carnaby's Cockatoo populations.

Project survey data suggest that whilst all regions and habitats are used, areas containing significant proportions of native vegetation and the introduced pines in plantations are able to support greater numbers of birds at a larger number of sites. Small areas of native Bushland, as in the north metro area, only support small numbers of birds, and probably only for short periods of time. Similarly, areas that have been cleared for agriculture, or further urban development, will be unable to support Carnaby's Cockatoos or will support far fewer birds. Patterns of movement are likely to be related to food availability throughout the year which in turn are likely to determine roost site use.

As habitat fragmentation, clearing of native vegetation and the progressive removal of pine plantations continue, less food will be available to the cockatoos. In the short term, this may result in large flocks splitting up to forage in smaller flocks, travelling further afield in search of food, with possible greater exposure to predators, reduced fat stores and reduced fitness. The impact of reduced flock sizes on the social structure of this sociable species is unknown.

Land-clearing, coupled with the life history of this bird and other threats such as habitat fragmentation and competition from more aggressive bird species has serious implications for the long term survival of the species. Further studies are required to determine detailed patterns of habitat use, and suggest methods for mitigating the impact of urbanisation and development on Carnaby's Cockatoos. In the interim, the precautionary principle must be observed because this study shows that the cockatoos use the entire landscape of the Swan Coastal Plain during the course of the non-breeding season. The precautionary principle states that where the scientific evidence is uncertain, decision-makers should take action to limit continued environmental damage and should err on the side of caution when evaluating proposals that may seriously or irreversibly impact on the environment.

7. Summary

- A definite minimum population estimate of 4510 birds on the Swan Coastal Plain was obtained, with evidence that bird numbers and abundance are influenced by vegetation and land-use.
- Areas with pine plantations and native vegetation, such as the Northern Region, clearly had a greater number and abundance of birds than highly urbanised areas such as the North Metro or cleared areas.
- Carnaby's Cockatoos used the same roost sites over a period of time, suggesting that these are important for the birds. Identified roost sites were primarily tall pine trees and Eucalypt trees with apparently dense canopies.
- Significantly, pine plantations appeared to play an important role in the ecology of Carnaby's Cockatoos on the Swan Coastal Plain – a large proportion of birds counted were in pine plantations, roosted in pine trees, and fed on pine cones. Further, the flock following exercise in the Northern Region showed that they spent about half their time in the plantations.

8. Future Directions

Directions for future studies:

- Conduct further roost counts to determine how many birds are using the Swan Coastal Plain.
- Determine how Carnaby's Cockatoos are using the landscape on the Plain.
- Determine whether habitat fragmentation really is a problem, and at what level.
- Determine the critical habitat resources required by the population of Carnaby's Cockatoos on the Plain.
- Determine the effect on the population of continuing to lose habitat at the current rate.

9. Conservation Implications

These studies suggest that there are important conservation implications for the Carnaby's Cockatoo population with respect to clearing, and possibly fragmentation, of large tracts of native Bushland in and around the Perth metropolitan area. Progressive removal over the next 10 – 20 years of pine plantations and remnant pine trees on the Swan Coastal Plain will also have a significant and negative impact on the population of Carnaby's Cockatoos using the Swan Coastal Plain.

Thirty eight percent (6 of 16) roost sites identified during this study have either already been cleared or are ear-marked for clearing in the near future.

Urgent action is required to ameliorate the effects of these changes.

10. Further Reading

- Alderman, A. & Clarke, M. (2003). *Moore River catchment appraisal 2002*. Technical Report 263. Department of Agriculture Western Australia, Perth.
- Beard, J.S. (1990). *Plant life of Western Australia*. Kangaroo Press, Kenthurst, NSW.
- Cale, B. (2003). *Carnaby's Black-Cockatoo (Calyptorhynchus latirostris) Recovery Plan 2000-2009*. Western Australian Wildlife Management Program No. 36. Perth, Department of Conservation and Land Management Western Australian Threatened Species and Communities Unit.
- Carnaby, I. C. (1948). Variation in the white-tailed black cockatoo. *Western Australian Naturalist* 1: 136-138.
- Cochrane, A. (2002). *Seed notes for Western Australia*. Wildflower Society of Western Australia, Perth Branch, Nedlands.
- Cooper C. (2000). Food manipulation by southwest Australian Cockatoos. *Eclectus* 8: 7-15.
- Cooper, C.E., Withers, P.C., Mawson, P.R., Bradshaw, S.D., Prince, J., & Robertson, R. (2002). Metabolic ecology of cockatoos in the south-west of Western Australia. *Australian Journal of Zoology* 50: 67-76.
- Davies, S. J. J. F. (1966). The movements of the white-tailed black cockatoo (*Calyptorhynchus baudinii*) in south-western Australia. *Western Australian Naturalist* 10: 33-42.
- Department of Conservation and Land Management (1999). *Gnangara Park: a concept plan to identify the main issues and discuss proposed directions for the Park*. Perth, Department of Conservation and Land Management.
- Garnett, S.T. & G.M. Crowley (2000). *The Action Plan for Australian Birds*. Canberra, Environment Australia.
- Garnett, S. (2000). Australia, New Zealand and the South-west Pacific. In *Parrots. Status Survey and Conservation. Action Plan 2000-2004*, eds. Snyder, N., McGowan, P., Gilardi, J. and Grajal, A., pp 34-57. IUCN, Gland, Switzerland and Cambridge, UK.
- Gole, C. Ed. (2003). *Conserving Carnaby's Black-Cockatoo, Future Directions, Proceedings from a Conservation Symposium*, Perth. Birds Australia WA.
- Johnstone, R.E. and Storr, G.M. (1998). *Handbook of Western Australian Birds, Volume 1, non-passerines (Emu to Dollarbird)*. Western Australian Museum, Perth.
- Mell. D. and Wetherall, J. (1992). To catch a thief. *Landscape* 7(4): 28-32.
- Myers, N., Mittermeier, R.A., Mittermeier, C.G., da Fonseca, G.A.B. & Kent, J. (2000). Biodiversity hotspots for conservation priorities. *Nature* 403: 853-858.
- Neesham, H. (1996). Naretha Bluebonnets – captive breeding program initiated by CALM. The Avicultural Federation of Australia. Eighth National Convention, Perth Western Australia.
- Perry, D. H. (1948). Black cockatoos and pine plantations. *Western Australian Naturalist* 1: 133 - 135.

- Saunders, D. A. (1974). Subspeciation in the White-tailed Black Cockatoo, *Calyptorhynchus baudinii*, in Western Australia. *Australian Wildlife Research* 1: 55-69.
- Saunders, D.A. (1977). The effects of agricultural clearing on the breeding success of the White-tailed Black-Cockatoo. *Emu* 77:180-184.
- Saunders, D. A. (1979). Distribution and taxonomy of the White-tailed and Yellow-tailed Black Cockatoos *Calyptorhynchus* spp. *Emu* 79: 215-227.
- Saunders, D. A. (1980). Food and movements of the short-billed form of the White-tailed Black Cockatoo. *Australian Wildlife Research* 7: 257-269.
- Saunders, D. A. (1982). The breeding behaviour and biology of the short-billed form of the White-tailed Black Cockatoo *Calyptorhynchus funereus*. *Ibis* 124: 422-455.
- Saunders, D. A. (1986). Breeding season, nesting success and nestling growth in Carnaby's Cockatoo, *Calyptorhynchus funereus latirostris*, over 16 years at Coomallo Creek, and a method for assessing the viability of population in other areas. *Australian Wildlife Research* 13: 261-273.
- Saunders, D. A. (1990). Problems of survival in an extensively cultivated landscape: the case of Carnaby's cockatoo *Calyptorhynchus funereus latirostris*. *Biological Conservation* 54: 277-290.
- Saunders, D. A. and Ingram, J. A. (1995). *Birds of Southwestern Australia: an Atlas of Changes in Distribution and Abundance of the Wheatbelt Avifauna*. Surrey Beatty and Sons, Chipping Norton, NSW.
- Saunders, D. A. and Ingram, J. A. (1998). Factors affecting survival of breeding populations of Carnaby's Black-Cockatoo *Calyptorhynchus funereus latirostris* in remnants of native vegetation. In: *Nature Conservation: the Role of Remnants of Native Vegetation*, eds. Saunders, D.A., Arnold, G.W., Burbidge, A.A. & Hopkins, A.J.M., pp. 249-258. Surrey Beatty & Sons, Chipping Norton, NSW.
- Saunders, D. A. and Ingram, J. A. (1998). Twenty-eight years of monitoring a breeding population of Carnaby's Cockatoo. *Pacific Conservation Biology* 4: 261-270.
- Saunders, D. A., Smith, G. T., Ingram, J. A. and Forrester, R. I. (2003). Changes in a remnant of salmon gum *Eucalyptus salmonophloia* and York gum *E. loxophleba* woodland, 1978 to 1997. Implications for woodland conservation in the wheat-sheep regions of Australia. *Biological Conservation* 110: 245-256.
- Saunders, D. A., Smith, G. T. and Rowley, I. (1982). The availability and dimensions of tree hollows that provide nest sites for cockatoos (Psittaciformes) in Western Australia. *Australian Wildlife Research* 9: 541-556.
- Snyder, N. (2000). *Parrots. Status Survey and Conservation. Action Plan 2000-2004*, eds. Snyder, N., McGowan, P., Gilardi, J. and Grajal, A., pp 34-57. IUCN, Gland, Switzerland and Cambridge, UK.

11. APPENDICES

Appendix 1: Area count form (26 March 2006)

Carnaby's Black-Cockatoo: Bird Count on the Swan Coastal Plain Sunday 26 March 2006 – 4.00 – 6.30 pm



Survey Aim: To estimate the population of this endangered species in the rapidly developing Swan region.

Instructions

Prior to survey date:

- **Read all the information** and call your Volunteer Coordinator with any questions.
Northern Regions: Jacqui, northernregion@carnabyscockatoo.org, 0428 946 001 (Gingin to Reid Hwy)
North Metro: Sue M, northmetro@carnabyscockatoo.org, 9389 6416 (Reid HWY to NOR)
South Metro: Robyn, southmetro@carnabyscockatoo.org, 9417 2820 (SOR to Rowley Rd)
Rockingham to Peel: Debbie, rocky2peel@carnabyscockatoo.org, 9398 5169 (Rowley Rd to Waroona)
Preston Bch to Bunbury: Sue K, southernregion@carnabyscockatoo.org, 9791 4550 (Waroona to Bunbury)
- Be clear on your **agreed survey location** (between Gingin & Bunbury) & choose a good vantage point.
- Examine the example provided to ensure you understand how to fill in the form.
Check the website, www.carnabyscockatoo.org, to ensure you know what the birds look like and to **practice your counting skills!**
You are not expected to know the difference between the two white-tailed black-cockatoo species.
- This survey will **help determine which areas are and are not being used** by the birds – **a zero count is as important as a 'positive' count.**

On the survey date:

Method

- **Equipment:** survey sheet/s, something to lean on, a pen, compass, watch, GPS (if you have one), map, torch, binoculars, water, food, a seat, sunscreen/ insect repellent.
- **Arrive at the agreed survey location by 3.30pm** and record from outdoors to maximise field of view.
- **Select a spot with a good field of view within the agreed survey area** and remain within 20m of that area – please record birds as far away as you can see.
- **Bird counting**
 - **For 10 or fewer birds**, or in open spaces, it should be relatively easy to count exact numbers of birds – you can use binoculars if counting birds perched in a tree a distance away.
 - **For large flocks flying** overhead fast or in areas with limited vision, binoculars may not be useful and you may have difficulty counting them individually. Don't give up! Instead, count a subgroup of 10 or 25 birds and see how large that group looks. Look at your count size and figure out how many groups of that size you can see. Multiply the number of groups by the size of your subgroup (e.g. 5 groups x 10 birds/group = 50 birds). To get the best estimate, repeat this procedure several times. For very large flocks of birds (many hundreds or thousands) you may need to count a small subgroup (e.g. 10 birds), estimate the size of a larger subgroup (e.g. 100 birds) then use the apparent size of the larger subgroup to estimate numbers in your flock. SEE THE WEBSITE FOR A WORKED EXAMPLE: www.carnabyscockatoo.org

Filling out the form

- **Location information** – vital to enable accurate identification of the site. Please be as specific as possible and include GPS coordinates if available, the name of the Park/ Reserve, etc, street address including nearest crossroads and suburb. Include the **site type** that you are surveying.
- **Bird activity information.** Record:
 - **time** when you observed the birds;
 - **number** of birds seen – best estimate if necessary;
 - **activity** in which the birds were engaged at time of observation –
In flight over site, feeding, drinking, resting or sitting in a tree, roosting (settled to sleep overnight)

IMPORTANT –**For small, easy to count flocks, please count birds only once.****For large flocks with individuals constantly moving, use the biggest count only.**

- approximate **distance** of the birds from the observer at the closest point in flight – if the birds land, record the distance from yourself to the birds the first time they land; and
- **direction** in which birds were flying either in, over, or out of the site – determine where North is at your site, then face that direction each time you see birds.
- **Overnight Roost information** – if you have observed birds roosting overnight in a site, please provide location details as above in “location information”.
- **Feeding** – if birds were feeding, please note plant species name, a description if name unknown, and what the birds were feeding on. You can include digital photos if in doubt.

Health & Safety:

- Please be aware of health & safety concerns for your site and take appropriate precautions, including telling someone where you are and when you expect to be back. Avoid remaining in remote areas alone, especially after dark.
- Do not enter an area if environmental or other conditions make it unsafe to do so.
- Please do not enter private land without the owner’s consent.
- Some roads may not be suitable for 2WD vehicles – please assess the suitability of roads/tracks for your vehicle.
- REMEMBER THAT YOUR SAFETY IS YOUR RESPONSIBILITY.

EXAMPLE:Name: Mr Pumba Warthog Number of people surveying: 5Tel: 0477 777 777 / 9777 7777 Email: pumba@warthog.com.auPostal address: 1 Warthog Crescent, Warthog Hill 6000**Survey Location:**GPS coordinates: 31° 48' 30" S, 115° 47' 20" E Datum (GDA preferred): GDA 94Site name (eg Park/ Reserve name, &/or road name): My Local Elephant Reserve, Trigg 6029Street Address & Suburb: 1 Elephant Road, Watermans Bay 6020Nearest cross-roads: Elephant Rd & Rhino RdStreet directory coordinates (e.g. Perth UBD 2005, pg 166, J5) : Perth UBD 2005, pg 777, B7Site type: Housing Natural Bush Pine Plantation Paddocks/ sports parks OtherTime spent observing: 4.00pm to 6.30pm**Bird Survey:**Cockatoos NOT seen or heard Total number of Cockatoos seen: 84

Time	No. of birds seen	Birds heard, not seen? y or n/a	Activity of birds in flock (tick appropriate box – please record activities of various birds in same flock in one row only)					Distance from Observer (m)	Direction of flight (N, NE, E, SE, S, SW, W, NW)			Comments
			In flight over site	Feeding (PTO)	Drinking	Resting/ Sitting	Roosting overnight		Over	In	Out	
4.05	12	n/a	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	100		E		
4.10	0	y	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	n/a				Heard birds to W – think may be same birds seen at 4.05
5.05	16		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	200	NE			
5.24	8		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	50		E	SE	Some feeding, some drinking, here for 10 – 15 min
6.00	18		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	150	NW			
6.25	25		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	100		S		Settled for night so probable roost site

Carnaby's Black-Cockatoo: Bird Count on the Swan Coastal Plain

**Important:**

- Please complete this survey in the agreed area and during the observation period.
- If you are unsure about any part of the survey, please call your Volunteer Coordinator before the survey date!

Date: Sunday 26 March 2006 Time Period: 4.00 – 6.30 pm (sunset is @ 6.20 pm)

Name:

Number of people surveying:

Tel:

Email:

Postal address:

Survey Location:

GPS coordinates: ° ' " S, ° ' " E **Datum** (GDA 94 preferred):

Site name & address (include street name & suburb):

Nearest cross roads:

Street directory coordinates (e.g. Perth UBD 2005, pg 166, J5):

Site type: Housing Natural Bush Pine Plantation Paddocks/ sports parks Other

Time spent observing: to

Bird Survey:

- **FOR SMALL, EASY TO COUNT FLOCKS, PLEASE COUNT BIRDS ONLY ONCE.**
- **FOR LARGE FLOCKS WITH BIRDS CONSTANTLY MOVING, USE THE BIGGEST COUNT ONLY.**
- **NUMBER OF BIRDS SEEN & TIME 1ST SEEN ARE EXTREMELY IMPORTANT.**
- **PLEASE RECORD ONLY THE FIRST TIME YOU SEE OR HEAR BIRDS, EVEN IF CALLING CONTINUOUSLY.**

Cockatoos NOT seen or heard Total number of Cockatoos seen:



Time	No. of birds seen	Birds heard, not seen? y or n/a	Activity of birds in flock (tick appropriate box – please record activities of various birds in same flock in one row only)					Distance from Observer (m)	Direction of flight (N, NE, E, SE, S, SW, W, NW)			Comments (e.g. length of time flock remained at site)
			In flight over site	Feeding (PTO)	Drinking	Resting/Sitting	Roosting overnight		Over	In	Out	
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					

...Continued overleaf

Please return completed form by Monday 3 April 2006:

MarchSurvey@carnabyscockatoo.org or Bansi Shah, Birds Australia, 167 Perry Lakes Drive, Floreat WA 6014.

Carnaby's Black-Cockatoo: Bird Count on the Swan Coastal Plain



Continued from previous page...

Time	No. of birds seen	Birds heard, not seen? y or n/a	Activity of birds in flock (tick appropriate box – please record activities of various birds in same flock in one row only)					Distance from Observer (m)	Direction of flight (N, NE, E, SE, S, SW, W, NW)			Comments
			In flight over site	Feeding (PTO)	Drinking	Resting/Sitting	Roosting overnight		Over	In	Out	
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					

Feeding:

If any of the birds were feeding, please provide information below:

Time	No. of birds	Feeding information		
		Plant name (common &/or scientific)	If unknown, provide description	Feeding on flowers, seeds, nuts?

Roost Sites:

Do you know of any overnight roost sites of Carnaby's Black-Cockatoos? [y/n]

If yes, please provide details of location/s:

GPS coordinates: ° ' " S, ° ' " E Datum (GDA 94 preferred):

Site name & address (include street name & suburb):

Nearest Cross roads:

Street directory coordinates (e.g. Perth UBD 2005, pg 166, J5):

Thank you for taking part in the survey to help us estimate the population of Carnaby's using the Swan Coastal Plain.

Please return the form by **Monday 3 April**, even if you don't see any birds.

We hope you will participate in the **next survey on Sunday 14 May 2006!**

Go to www.carnabyscockatoo.org to learn more and to keep up to date with what's going on.

Bansi Shah



Please return completed form by Monday 3 April 2006:

Email: MarchSurvey@carnabyscockatoo.org

Post: Bansi Shah, Birds Australia, 167 Perry Lakes Drive, Floreat WA 6014.

Appendix 2: Roost count form (9 April 2006)

Carnaby's Black-Cockatoo: Roost count on the Swan Coastal Plain



Survey Aim: To determine the total number of birds roosting at known and suspected roost sites.

Date: Sunday 9 April 2006

Time Period: 5.45 – 7.00 pm (sunset is @ 6.03 pm)

OVERNIGHT ROOST - this is the place in which the birds rest/ sleep for the night.

- Please arrive at your allocated site by 5.45pm so that you can locate the birds (& find your way in and out!).
- Please remain at the roost site until you can no longer see any more birds arriving (or you cannot see because it's too dark!).
- The aim of this count is to determine the TOTAL number of birds roosting overnight at your roost site, so you may/will need to:
 - count the number of birds several times and then provide your best estimate of the number of birds roosting.
 - count birds as they arrive at your site (particularly useful for pine trees and other dense vegetation).
 - Count any birds that leave the site to roost elsewhere, and the direction in which they flew.
- **Equipment:** survey sheet/s, something to lean on, a pen, compass, watch, GPS (if you have one), map, TORCH, BINOCULARS, water, a seat, insect repellent.

Check the website, www.carnabyscockatoo.org, to **practice your counting skills!**

Name:

Email:

Tel:

Postal address:

Time Spent observing: to

Location details:

GPS coordinates: ° ' " S, ° ' " E

Site name (eg Park/ Reserve name, &/or road name):

Distance from nearest road:

Direction (roost site to nearest road):

Street Address & Suburb:

Street directory coordinates:

Roost details:

TOTAL number of birds seen:

Count accuracy: estimate or exact

TIME of final count:

Do you think the birds have settled for the night?

Can you hear birds that you have not counted?

Vegetation in which birds seen roosting:

Roost site description:

Roost area size (in metres):

How accurate do you think your estimation is?

Continued overleaf...

Please return completed form by Monday 17 April 2006 to:

Email: roosting@carnabyscockatoo.org, **Post:** Bansi Shah, Swan Coastal Coordinator, Carnaby's Black-Cockatoo Recovery Project, Birds Australia, 167 Perry Lakes Drive, Floreat WA 6014.

Continued from previous page...

Comments (e.g. 500 birds flew in but only 150 roosted here, others flew northwest at 6.20pm):

Was it easy or difficult to count birds at the roosting site?

If it was difficult, why?

Health & Safety:

- Please be aware of health & safety concerns for your site and take appropriate precautions, including telling someone where you are and when you expect to be back. Avoid remaining in remote areas alone, especially after dark.
- Please ensure that you know where you are and that you will be able to find your way back to your vehicle after sunset!
- Do not enter an area if environmental or other conditions make it unsafe to do so.
- Please do not enter private land without the owner's consent.
- Some roads may not be suitable for 2WD vehicles – please assess the suitability of roads/tracks for your vehicle.
- REMEMBER THAT YOUR SAFETY IS YOUR RESPONSIBILITY.

Please return completed form by Monday 17 April 2006 to:

Email: roosting@carnabyscockatoo.org

Post: Bansi Shah, Swan Coastal Coordinator, Carnaby's Black-Cockatoo Recovery Project, Birds Australia, 167 Perry Lakes Drive, Floreat WA 6014.

Appendix 3: Transect search form (29 April 2006)

Carnaby's Black-Cockatoo:

Transect count: Nthn Swan Coastal Plain, 29 April 2006

Survey Aim: To determine where Carnaby's Black Cockatoo feed, the number feeding in major habitat types and the main plants on which they feed. This information will help us begin to clarify how the birds use the various food resources on the coastal plain.

Instructions for completing the survey:

- Record your contact details and name of your transect. At the start of the survey, record vehicle odometer reading, GPS coordinates and direction of travel.
- When you see Carnaby's Cockatoos, stop the vehicle. Record the time, vehicle odometer reading and GPS coordinates, plus the number of Cockatoos seen flying, loafing or feeding.
- If birds are feeding complete feeding form on back of sheet.
- At completion of transect survey, record time, vehicle odometer reading and GPS coordinates.

Name:	Tel:	Email:
Number of observers:	Transect name:	
Odometer reading (start):	Odometer reading (finish):	
Start time:	Finish time:	GPS Datum (GDA preferred):
GPS reading start: ° ' "S ° ' "E	Starting direction:	
GPS reading finish: ° ' "S ° ' "E		
If no cockatoos seen during transect survey, mark this box: <input type="checkbox"/>		

Location Number (match with back of form)	Time	Odometer reading	GPS coordinates	Total number in flock	Number not feeding		Number birds feeding - go to back of form	Comments (e.g. coordinates at end if large flock)
					In Flight	Loafing		
			° ' "S ° ' "E					
			° ' "S ° ' "E					
			° ' "S ° ' "E					
			° ' "S ° ' "E					
			° ' "S ° ' "E					
			° ' "S ° ' "E					

****Please see over for feeding form****

Please return completed form to Bansi Shah via email on vegssurveys@carnabyscockatoo.org, or via post to Bansi Shah, Swan Coastal Coordinator, Carnaby's Black-Cockatoo Recovery Project, Birds Australia, 167 Perry Lakes Drive, Floreat WA 6014. For further information, or to find out how to help in other ways (including bird and vegetation surveys), please see www.carnabyscockatoo.org



Birds Australia WA
167 Perry Lakes Drive
FLOREAT WA 6014
Telephone: 08-9383 7749
Fax: 08-9387 8412
Email: birdswa@iinet.net.au
Web: <http://birdswa.iinet.net.au>

Thursday, 14 December 2006

Dear volunteers,

Many thanks for agreeing to take part in a trial transect search for Carnaby's Cockatoos this coming Saturday. The search is in the Yanchep/Pinjara/Gnangara area north of Perth and the aim is to attempt to find where the cockatoos are feeding during the morning and what they are feeding on. A broader aim is to test whether counting Carnaby's Cockatoos along tracks can be useful in indicating numbers of birds in a particular area.

The count is from 7.30 to 11.30 am on Saturday 29th April. Please be at the starting point indicated on the enclosed map of your transect no later than 7.30, as there is some recent indication that flocks may begin feeding considerably earlier than that and begin to move not long after 7.30.

In addition to the map you will find enclosed two copies of a double sided form and two copies of a single sided form for feeding details. The double sided form has the form for actual observations along your transects on one side and the feeding details form on the other. Depending on how many flocks you see and how many species of plants cockatoos are feeding on you may need only one double sided form for the day.

Please ensure that each separate flock of birds and the associated details are recorded in one row of the main transect form and that each plant species on which birds are feeding is allocated a single row on the feeding form, no matter how many birds are feeding on that species. It is important to ensure that all lines on the feeding form are clearly allocated to a particular transect record. That is, if on the transect form a flock, including 100 birds feeding, is recorded at a particular latitude and longitude, ensure that every species on which they are feeding is matched with those coordinates. If the 100 birds are feeding on five different species of plants then five lines on the feeding form will have the same location and the total of the "Number of cockatoos seen feeding" column for that location should be 100.

With large dispersed flocks it can be a bit difficult deciding when one flock ends and another begins. For our purposes it is better to be conservative in assigning flock status – If you have some hundreds of birds spread over several hectares but no clear break of many hundreds of metres between them then call it a single flock. In any case, if it is clear that birds are coming and going from one sub-flock to another call it a single flock even if the separation between sub-flocks is several hundred metres. In the case of such a large flock please record position details (time, odometer and GPS readings) when you first encounter the flock and at the far edge once you have passed through it.

We are intending to have a barbeque lunch (BYO) at Yanchep National Park, beginning about 12 noon and hope you can join us. (details of place to be added)

Thanks again and regards

John Blyth

EMAIL MESSAGE WITH ADDITIONAL INSTRUCTIONS

From: John Blyth
To: Volunteers
Date: 26 April 2006

I am very grateful to Clayton Sanders of CALM who has mobilised four or five cars of CALM staff for pre-survey investigations and for survey on Saturday. Clayton also drew up the transect maps that are in the envelope on its way to you. As always there are certain things that have been forgotten in the letter and I am aware that you are all experienced Carnaby's surveyors. However, with thanks to Bansi, I list below a few reminders about some basic procedures and some health and safety matters.

1. Familiarise yourself with your transect and the maps you will be following. As the maps will show the transects are in fact one (or more) more or less u-shaped loops, from west to east and back again along a different line, starting and finishing at main roads. Each transect has been allocated a name, shown on the map and marked on the first page of a form in your envelope, but please ensure that it goes onto any subsequent forms.
2. ESSENTIALS: 4WD, at least 2 people in each vehicle, CDMA mobile phone for emergencies, GPS.
3. Desirable: tyre pump running off the vehicle in case you have to let tyres down in sandy areas.
4. Things to take: forms, pen, maps, extra paper, binoculars, compass, GPS, water, food, sunscreen/ insect repellent.
5. Be at your starting point by 7.30am latest.
6. Drive at a speed of about 10km an hour to enable you to hear/ see birds.
7. Stop the vehicle every 500m and switch off engine – look and listen for Carnaby's for about 1 minute (you can get out of the vehicle if necessary).
8. If you see any Carnaby's either whilst stopped or whilst driving, stop the vehicle and record the information on the form, including feeding information if relevant.
9. Each transect is between about 15 and 20km long so you should be able to cover it out and back within the allocated 4 hours. For those who are coming to Yanchep for a BYO barbeque the details of how to get there are in the envelope. For those who are not coming to the BBQ could you please let me or Bansi know.
- 10. Health & Safety:**
 - a. Please be aware of health & safety concerns for your site and take appropriate precautions, including travelling along the exact route shown on the map. An emergency telephone number is provided in the letter. Avoid remaining in remote areas alone, especially after dark.
 - b. Please ensure that you know where you are at all times and that you will be able to find your way back to your vehicle and the main road!
 - c. Do not enter an area if environmental or other conditions make it unsafe or inappropriate to do so.
 - d. Please do not enter private land without the owner's consent.
 - e. Some roads may not be suitable for your vehicle and/or experience – please assess the suitability of roads/tracks for your vehicle. However, if you follow the transect marked on your map there should be few problems.
 - f. REMEMBER THAT YOUR SAFETY IS YOUR RESPONSIBILITY.

Appendix 4: Roost fidelity form (29 April – 7 May 2006)

Carnaby's Black-Cockatoo: Roost count on the Swan Coastal Plain



Survey Aim: To determine the total number of birds roosting at known overnight roost sites & to determine roost site fidelity.

Date range: Saturday 29 April – Sunday 7 May 2006

Time Period: ~ 1 hour before sunset to ~ ½ hour after sunset

- Please arrive at your allocated roost site at least an hour before sunset so that you can locate the birds (& find your way in and out!).
- Please remain at the roost site until you can no longer see any more birds arriving (or you cannot see because it's too dark!).
- The aim of this count is to determine the TOTAL number of birds roosting overnight at your roost site, so you may/will need to:
 - count the number of birds several times and then provide your best estimate of the number of birds roosting.
 - count birds as they arrive at your site (particularly useful for pine trees and other dense vegetation).
 - count any birds that leave the site to roost elsewhere, and the direction in which they flew.
- **Equipment:** survey sheet/s, something to lean on, a pen, TORCH, BINOCULARS, water, insect repellent, compass, watch, GPS (if you have one), map.
- **Sunset:** 29 April (5.41pm), 30 April (5.40pm), 1 May (5.39pm), 2 May (5.38pm), 3 May (5.37pm), 4 May (5.36pm), 5 May (5.35pm), 6 May (5.35pm), 7 May (5.34pm).

Name:	Tel:	Email:									
Site name & address:				GPS coordinates:		°	'	"S	°	'	"E

Date	Observation period		TOTAL birds		TOTAL ROOSTING birds (settled for night)		Roost area (in metres & no. of trees occupied)	Comments (e.g. count accuracy, whether you can hear birds you haven't counted, etc).
	Start	Finish	Number seen	Time of count	Number seen	Time of count		
1								
2								
3								

Continued overleaf...

Please return completed form by Thursday 11 May 2006 to:
 Email: roosting@carnabyscockatoo.org, Post: Bansi Shah, Swan Coastal Coordinator, Carnaby's Black-Cockatoo Recovery Project, Birds Australia, 167 Perry Lakes Drive, Floreat WA 6014.

Continued from previous page...

	Date	Observation period		TOTAL birds		TOTAL ROOSTING birds (settled for night)		Roost area (in metres & no. of trees occupied)	Comments (e.g. count accuracy, whether you can hear birds you haven't counted, etc).
		Start	Finish	Number seen	Time of count	Number seen	Time of count		
4									
5									
6									
7									
8									
9									

Health & Safety:

- Please be aware of health & safety concerns for your site and take appropriate precautions, including telling someone where you are and when you expect to be back. Avoid remaining in remote areas alone, especially after dark.
- Please ensure that you know where you are and that you will be able to find your way back to your vehicle after sunset!
- Do not enter an area if environmental or other conditions make it unsafe to do so.
- Please do not enter private land without the owner's consent.
- Some roads may not be suitable for 2WD vehicles – please assess the suitability of roads/tracks for your vehicle.
- REMEMBER THAT YOUR SAFETY IS YOUR RESPONSIBILITY.

Please return completed form by Thursday 11 May 2006 to:

Email: roosting@carnabyscockatoo.org

Post: Bansi Shah, Swan Coastal Coordinator, Carnaby's Black-Cockatoo Recovery Project, Birds Australia, 167 Perry Lakes Drive, Floreat WA 6014.

Appendix 5: Feeding form

Carnaby's Black-Cockatoo: Feeding on the Swan Coastal Plain



Survey Aim: To determine the plants on which Carnaby's Black-Cockatoos feed - this is not as well documented for the Swan Coastal Plain as for other parts of its distribution. This information will enable assessment of relative importance of various food sources on the Plain.

Instructions for completing the survey:

- **Email file naming convention: Last Name – Park, Suburb - Date** (e.g. Shah – Shark Res, Sharkville – 12 Feb)
- Record date, site name, street address & suburb, GPS coordinates & number of Carnaby's Cockatoos seen feeding.
- Sites can be anywhere between Gingin and Bunbury on the Plain - *not* on the Darling Range or its slopes or escarpment.
- If you can identify the plant, please record the scientific and common names – don't worry if you don't know both.
- **If you cannot identify the plant**, we will need some other method for determining the plant species. Options are:
 - provide a photograph and ensure enough of the plant is visible to enable identification – you can take a photo of the entire plant and then a close-up of the fruit/ flower/ leaves. Digital photos can be emailed or provided on a CD or disk (hard copies of photos can be returned if required);
 - draw the plant, including a close-up drawing of a fruit, flower and leaf;
 - collect a sample of the plant **only if it is non-native and a weed**. If unsure, please do not pick flora without a CALM collecting license;
 - collect samples of eaten fruits from the ground and send in.

Name:

Tel:

Email:

Postal address:

Date & time	Site name (Park/ Reserve, etc name)	Street address & suburb	GPS coordinates (if available)	No. of cockatoos seen feeding	Plant Scientific name	Plant Common name	Description if name not known - (e.g. shrub or tree, height, leaf description, flower description, native or non-native)	Part of plant being eaten (fruit, flowers, nuts, nectar, etc)	Photo (P)/ drawing (D) attached? (y/n)
22/11/05 4.15pm *example*	Shark Reserve	Shark St, Sharkville 6000	31° 26' 30" S 115° 37' 29" E	6	<i>Banksia</i> spp	Banksia (unsure)	Small trees, ~ 3 m, long thin leaves, serrated leaf edges, long yellow banksia flower, some woody fruit on ground	Flowers & seeds	P - see pic no. 1
			° ' "S ° ' "E						
			° ' "S ° ' "E						

****Please see over for additional space****

Please return completed form to Bansi Shah via email on vegsurveys@carnabyscockatoo.org, or via post to Bansi Shah, Swan Coastal Coordinator, Carnaby's Black-Cockatoo Recovery Project, Birds Australia, 167 Perry Lakes Drive, Floreat WA 6014.

For further information, or to find out how to help in other ways (including bird and vegetation surveys), please see www.carnabyscockatoo.org

Carnaby's Black-Cockatoo: Feeding on the Swan Coastal Plain



****Please see over for instructions on survey completion & example****

Date & time	Site name (Park/ Reserve, etc name)	Street address & suburb	GPS coordinates (if available)	No. of cockatoos seen feeding	Plant Scientific name	Plant Common name	Description if name not known - (e.g. shrub or tree, height, leaf description, flower description, native or non-native)	Part of plant being eaten (fruit, flowers, nuts, nectar, etc)	Photo (P)/ drawing (D) attached? (y/n)
			° ' "S ° ' "E						
			° ' "S ° ' "E						
			° ' "S ° ' "E						
			° ' "S ° ' "E						
			° ' "S ° ' "E						
			° ' "S ° ' "E						
			° ' "S ° ' "E						

Please return completed form to Bansi Shah via email on vegsurveys@carnabyscockatoo.org, or via post to Bansi Shah, Swan Coastal Coordinator, Carnaby's Black-Cockatoo Recovery Project, Birds Australia, 167 Perry Lakes Drive, Floreat WA 6014.

To find out how to help in other ways, including participating in bird surveys, see www.carnabyscockatoo.org

Appendix 6: Newspaper articles publicising the project and the bird counts.

Articles appearing from January to May 2006 featuring the 'Great Cocky Count' were highly successful in engaging local communities, simultaneously raising awareness.

a) The Post, 7 Jan 2006, page 4

PAGE 4

Can cockies count on you?

The wonderfully charismatic black cockatoos of WA need human help.

Carnaby's cockatoos have been listed as endangered, as their numbers are believed to have declined 50% in 45 years.

Carnaby's cockatoos are believed to breed mostly in the wheatbelt and return to the coast from late December to July to feed on banksia, dryandra and grevillea, marri nuts and pines.

Your help is needed to count them near the coast.

The big cockatoo count on Sunday February 12 aims to count the females which have a characteristic grey eye ring (males have a pink eye ring) and pale bone coloured beak.

The count involves counting birds, observing where they go and what they do at particular locations. Contact Bansi Shah at Birds Australia on 0427 707 047 or b.shah@birdsaustralia.com.au who is or-

ganising the count.

The red-tailed black cockatoo is also threatened and Water Corporation and WA Museum are backing a project to help them.

For details call 8420 2182 or www.cockatocare.com

b) The Wanneroo Times, 12 Jan 2006, page 3

Volunteer for the cocky count



ORGANISERS of the Great Cocky Count are hoping for a big roll-up of volunteers on Sunday, February 12.

That is what Birds Australia WA is calling its project aimed at encouraging the maintenance of nesting and feeding habitats of the threatened red-tailed black cockatoo and Baudin's cockatoo.

The organisation is running the project with WWF-Australia and CALM.

The Great Cocky Count is also aimed at reducing the effect of threats, counting birds, observing their flight direction and monitoring their activity at particular places.

The project is running with the co-operation of WWF-Australia and CALM and at the same time as the Cockatoo Care program, a joint initiative the Water Corporation and the WA Museum started in 2001.

Birds Australia WA Swan Coastal Plain co-ordinator Bansi Shah said many volunteers were needed to cover a wide area on February 12.

She wanted volunteers, including Friends groups, to get involved by surveying local parks, reserves and home gardens.

Birds Australia WA was also interested in numbers of banksia flowers through pine plantations.

There were five locations to be surveyed in the northern area, from Reid Highway up to Yanchep. Volunteers can contact her on 0427 707047.

John Murphy

A female Carnaby's cockatoo

c) Bunbury Mail, 25 Jan 2006, page 7



Local eyes needed to help count birds

A BUNBURY woman is coordinating the local leg of the Great Cocky Count – part of a project to ensure an endangered bird species will fly well into the future.

Sue Kalab and a group of volunteers will take to the great outdoors next month armed with binoculars to record sightings of the Carnaby's Black-Cockatoo (*Calyptorhynchus laticrostris*).

The bird is endangered and found only on the Swan Coastal Plain.

The count will help determine how many Carnaby's Black-Cockatoos there are and where they are, identifying critical habitat for the birds.

Information from the project, coordinated by the Carnaby's Black Cockatoo Recovery Program, will assist with conservation planning.

Volunteers are needed to help with extensive bird surveys on February 12.

If you would like to help out, contact Sue Kalab on 9791 4550 or email suekalab@hotmail.com

Have you got an eye for spotting birds? Bunbury woman Sue Kalab needs volunteers for the Great Cocky Count next month.

■ See Seddon, page 8.

d) Bunbury Mail, 25 Jan 2006, page 8



e) Bunbury Herald, 31 Jan 2006, page 6



Volunteers are asked to participate in survey's to record numbers of the endangered Carnaby's black cockatoo, like the one sitting on Bansi Shah's shoulder.

Bid to save cockatoo

A PROJECT is being conducted in the South West to collect information on the endangered Carnaby's black cockatoo, a species found only in this part of Australia.

The highly mobile black cockatoo's population is declining dramatically due to the impact of land clearing for urban development on the Swan Coastal Plain and agriculture in regional areas.

Swan coastal coordinator for the Carnaby's black-cockatoo recovery project Bansi Shah said during the past 45 years a 50 per cent decrease had been recorded in the species range and abundance.

"The long-term survival and recovery of Carnaby's cockatoo is linked to the survival of its habitat both in breeding areas in the Wheatbelt and non-breeding areas such as the Swan Coastal Plain," Ms Shah said.

The project aims to determine the population and distribution and determine the critical habitat of Carnaby's black cockatoos on the Swan Coastal Plain through extensive surveys.

Important baseline data that can help with conservation planning is lacking in the rapidly developing South West region.

But with increasing public awareness and support and future conservation planning based on good information, Ms Shah said there was still hope Carnaby's cockatoos would one day again blacken the sky as they fly overhead.

Volunteers are required to participate in the project which is vital in supporting this research for future conservation planning.

To register in the Greater Bunbury area contact Sue Kalab on 9791 4550. More information is available at www.carnabyscockatoo.org

Cocky count needs eyes

ORGANISERS of the Great Cocky Count are hoping for a big roll-up of volunteers on Sunday, February 12.

That is what Birds Australia WA is calling its project aimed at encouraging the maintenance of nesting and feeding habitats of the threatened red-tailed black cockatoo and baudin's cockatoo.

The organisation is running the project with WWF-Australia and CALM.

The Great Cocky Count is also aimed at reducing the effect of threats to the birds, counting birds, observing their flight direction and monitoring their activity at particular places.

The project is running at the same time as the Cockatoo Care program, a joint initiative of the Water Corporation and the WA Museum, which started in 2001.

Birds Australia WA Swan Coastal Plain coordinator Bansi Shah said many volunteers were needed to cover a wide area on February 12.

She wanted volunteers, including friends groups, to get involved by surveying local parks, reserves and home gardens.

"If you see a carna-by's cockatoo feeding on the plants on the Swan Coastal Plain,



A female carna-by's black cockatoo.

contact us to obtain a food plant record form," she said.

Birds Australia WA was also interested in numbers of banksia flowers through pine plantations.

There were five locations to be surveyed in the northern area from Reid Highway to Yanchep.

Volunteers can contact her on 0427 707 047.

John Murphy

Join counting of black cockatoos

by emma brennan

BIRDS Australia urgently needs volunteers to help with the Great Cocky Count.

The survey of Carnaby's black cockatoos, now listed as an endangered species, will take place on Sunday, February 12, along the vast Swan Coastal Plain.

Project co-ordinator Bansi Shah said the survey would help determine how many Carnaby's cockatoos there were and identify critical habitat for the birds.

"It is really important that we get people to help with the survey to find out how many birds are using the coastal plain for feeding during the non-breeding season each year," she said.

"We need a good spread of people to give a snapshot of numbers – the data will form the basis of further studies."

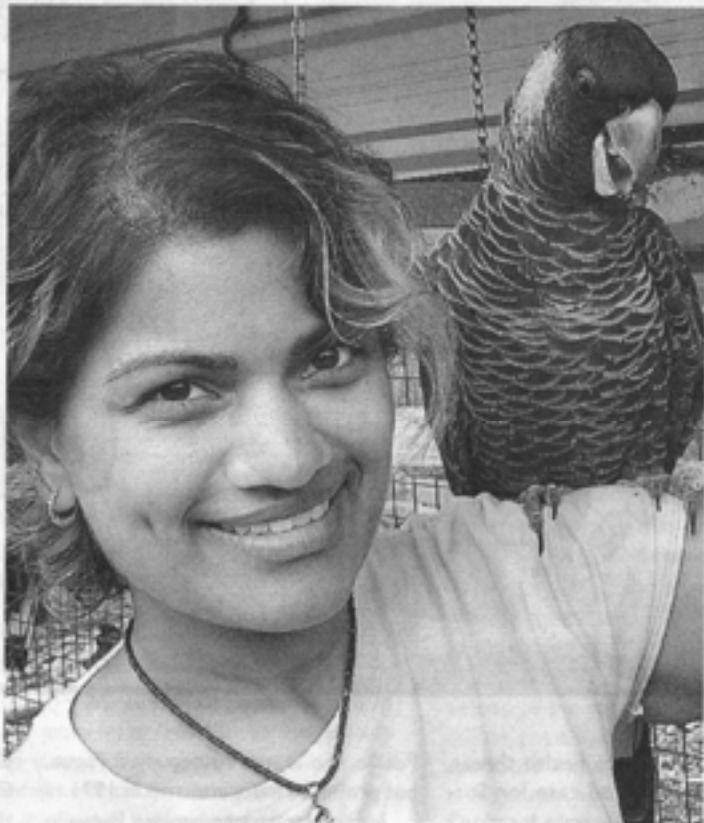
Carnaby's black cockatoo is found only in WA.

Populations have declined dramatically due to land clearing for urban development on the Swan Coastal Plain and for agriculture in regional areas.

The last 45 years has seen a 50 per cent decrease in the species' range and abundance.

Ms Shah said the cockatoos raised only one chick each season.

"People used to report seeing the cockatoos in flocks as large as



Bansi Shah with Rennie, a female Carnaby's cockatoo.

5000 birds. "Nowadays flocks are much smaller and are seen far less frequently," she said.

The long-term survival of Carnaby's cockatoo relies on the survival of its habitat.

Information from the Great Cocky Count will help with conservation planning in the Swan region.

Birds Australia needs volunteers to help with the survey from good vantage points anywhere on the coastal plain, with in local parks, reserves and home gardens.

For more details on how to contribute to the survey, call Jacqui on 0428 946001 or visit www.carnabyscockatoo.org to download a survey form.

The cocky count

BIRDS AUSTRALIA urgently needs volunteers to help with the Great Cocky Count.

The survey of Carnaby's black-cockatoos, now listed as a threatened species, will take place on Sunday, February 12 along the Swan Coastal Plain.

Project co-ordinator Bansi Shah said the survey would help to determine how many Carnaby's cockatoos there were and identify critical habitat for the birds.

"It is really important that we get people to help with the survey to find out how many birds are using the coastal plain for feeding during the non-breeding season each year," she said.

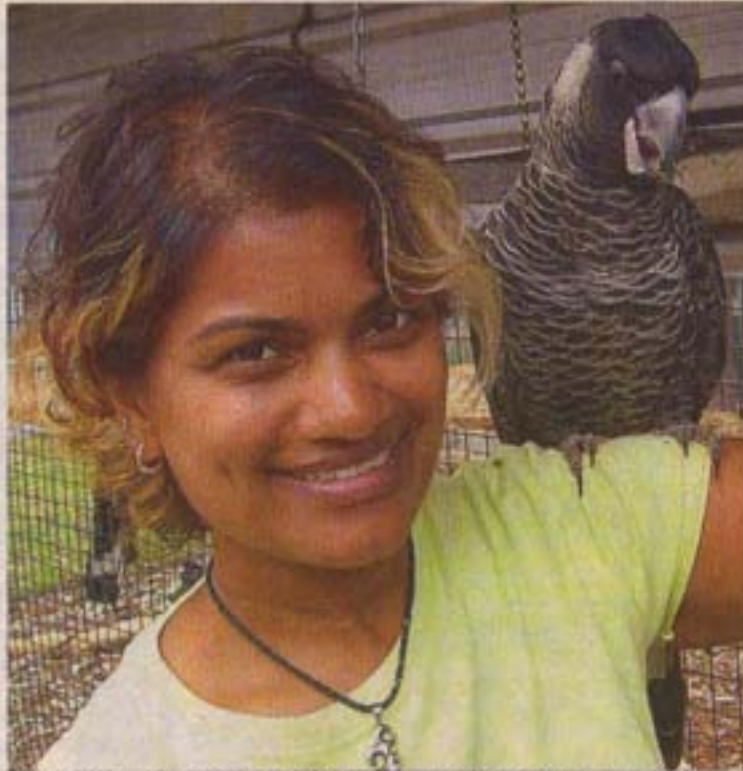
"We need a good spread of people to give a snapshot of numbers - the data will form the basis of further studies."

Carnaby's black-cockatoo is only found in WA.

Populations have declined dramatically due to land clearing for urban development on the Swan Coastal Plain and for agriculture in regional areas.

The last 45 years has seen a 50 per cent decrease in the species' range and abundance. Ms Shah said the cockatoos only raised one chick each season.

"People used to report seeing the cockatoos in flocks as large as 5000 birds. Nowadays flocks are much smaller and are seen far less frequently," she said.



Bansi Shah, Swan Coastal Coordinator of Birds Australia, with Rennie the female Carnaby's black cockatoo

The long-term survival of Carnaby's cockatoo relies on the survival of its habitat.

Information from the Great Cocky Count will help with conservation planning in the Swan region.

Birds Australia needs volunteers to help with the survey

from good vantage points anywhere on the coastal plain, with in local parks, reserves and home gardens.

For more details on how to contribute to the survey, call Jacqui on 0428 946001 or visit www.carnabyscockatoo.org to download a survey form.

i) The Joondalup Times, March 2006

Cocky count a success

THE VOLUNTEERS never believed they would see so many cockatoos in one flock.

But there they were, darkening the sky in flocks of up to 500.

It was the day of the Great Cockey Count, when Birds Australia and about 400 volunteers who answered BA's plea took to the bush at 220 locations along the Swan Coastal Plain from Gingin down to Bunbury.

They were looking for the black Carnaby's Cockatoo, endangered by human inroads into the environment through land clearing for urban and agricultural development.

Bansi Shah, who coordinates the Great



A black Carnaby's cockatoo in flight. Picture: Dave Manson

Cocky Count for BA, said some observers working in and near pine plantations and large tracts of native bush that Sunday February 26 counted up to 500 birds in a flock.

Now a second count is being organised for Sunday March 26.

Bansi said people who took part would have the same exciting time as those in the February count.

Volunteers were also asked to record what the birds ate when they came on them feeding along their flight path.

j) The Post, May 2006

Cockies make a welcome return



Last autumn I counted 20 Carnaby's cockatoos enjoying a feed on the pin-cushion hakea in my garden in Claremont, and worried that they are endangered when they are such wonderful birds.

This year, I have been worried that only five turned up for the annual feast, and to my deep disappointment one of my neighbours shooed them away, presumably because they make a noise and a bit of a mess.

But to my delight, today I counted 33 of them chomping and cheering - and they are always welcome in my garden.

Friend of Carnaby's
Bay View Terrace, Claremont
(Name supplied)

LEFT: Picture taken from the letter writer's bathroom window.

**Appendix 7: Popular articles (December to September 2006)
publicising the fate of the species, and project activities.**

a) Ecoplan News, CALM - Summer 2006, page 1



WA's black cockatoos need your help!

TWO Western Australian Projects are collecting baseline information on black cockatoos to help reverse the downward population trend for these birds. The participation of volunteers in the project surveys is vital in supporting this research for future conservation planning.

'Great cocky count' – can you help on Sunday 12 February?

By Bansi Shah

The charismatic Carnaby's cockatoo (*Calyptrorhynchus latirostris*) – once numerous in WA – is now listed as Endangered.

The species has declined 50 per cent in the past 45 years, with one of the main contributing factors being land clearing. Since 2001, Birds Australia, as a member of the Carnaby's Black Cockatoo Recovery Team, has operated the Carnaby's Black Cockatoo Recovery Project to raise awareness of the cockatoos' plight, identify and monitor breeding sites within the wheatbelt and improve breeding and feeding habitat.

A new project now aims to determine the population and spatial distribution of birds on the Swan Coastal Plain and identify critical habitat requirements. This critically important baseline information is currently lacking, and will assist with conservation planning in the rapidly developing Swan region. Key partners in this project are presently Birds Australia, WWF-Australia, and the Department of Conservation and Land Management (CALM).

Habitat requirements

Carnaby's cockatoos are believed to breed mostly in the wheatbelt, returning to coastal and near-coastal areas from late-December to July. The birds feed on a large variety of plants including Proteaceae (banksia, dryandra and grevillea), marrnits and introduced species – notably pines. The long-term survival and recovery of this species is inextricably linked to the survival of its habitat – both in breeding areas in the wheatbelt and non-breeding areas such as the Swan Coastal Plain.

'Great cocky count' volunteers needed.

Your help is needed to estimate the population of Carnaby's cockatoos on the Swan Coastal Plain by assisting with scientific surveys. The first survey will be on Sunday 12 February and will involve

Female Carnaby's cockatoo (*Calyptrorhynchus latirostris*) showing the characteristic grey eye ring (male pink) and pale bone-coloured beak (male black). (Photos: Bansi Shah and Dave Marston)



looking for cockatoos, counting birds, observing their flight direction and monitoring their activity at particular locations. For good estimates of the population on the Swan Coastal Plain, we require as many volunteers as possible across a wide area.

We ask volunteers, including Friends groups, to get involved and survey local parks, reserves and home gardens.

You too could be a part of the 'great cocky count' if there is a patch of bush near you!

The project will also identify critical feeding habitat, and record food preferences. If you see a Carnaby's cockatoo feeding on plants on the Swan Coastal Plain, contact us to obtain a food plant record form. Vegetation surveys will also be conducted to estimate food resources on the Swan Coastal Plain. If you are interested in undertaking counts of banksia flowers and/or transects through pine plantations, please join the volunteer team.

With increasing public awareness and support, and future conservation planning based on good information, there is still hope that Carnaby's cockatoos will again blacken the sky as they fly overhead.

Don't forget, Carnaby's cockatoo needs your help on Sunday 12 February 2006. Contact Bansi Shah, Swan Coastal Coordinator, Birds Australia on 0427 707 047 or email b.shah@birdsaustralia.com.au.

Cockatoo Care

The success of the Cockatoo Care program also relies on the collection of information by volunteers. Cockatoo Care, a joint initiative of Water Corporation and the Western Australian Museum, began in 2001. The project focuses primarily on the Threatened red-tailed black cockatoo (*Calyptrorhynchus banksii naso*) and Baudin's cockatoo (*Calyptrorhynchus baudini*) throughout the south-west, but also receives data on Carnaby's cockatoo.

The project aims to encourage the maintenance of nesting and feeding habitats, minimise the impact of threats,

undertake recovery planning and collect baseline information on diet, distribution, status, flock size, habitat preferences, movements and breeding biology.

How can you help?

Observation cards and frequent sighting forms filled in by the public are vital in supporting this research. More than 3000 observation records have been data-based. Contact the Water Corporation on 9420 2182 or www.cockatooecare.com.

Compiled by Jo Tregonning from the Cockatoo Care website. Also see 'Regional Reports', page 8 this edition.

REGIONAL NEWS

WESTERN AUSTRALIA

COUNTING COCKIES ON THE SWAN COASTAL PLAIN.

By Bansil Shah

Once numerous in WA, the enigmatic and highly mobile Carnaby's black cockatoo (*Calyptorhynchus latisrostris*) is now listed as endangered. Populations are declining dramatically due to land clearing for urban development in Perth and for agriculture in regional areas. The last 45 years has seen a 50% decrease in the species' range and abundance.

Any suitable habitat that remains for the Carnaby's is fragmented, and often degraded by soil salinity and weed invasion. Feeding habitat is often so far away from nests that the growth rate and survival of nestlings is significantly reduced.

The life history of this distinctive cockatoo makes it extremely vulnerable to threats resulting from human activities. Clearing of habitat such as on the Swan Coastal Plain continues to be a threat. The birds feed on a large variety of plants including Proteaceous species (banksia, dryandra and grevillea), marri nuts, and a range of introduced species like pine cones.

Carnaby's cockatoos are believed to breed mostly in the Wheatbelt, returning to coastal and near coastal areas from late December to July. Pairs bond for life and use large hollows in Eucalypt trees to produce just one chick per year. Breeding habitat has also been destroyed by the loss of old, hollow-bearing trees. Hollows may not form in those trees for 120 – 150 years and competition for hollows is increasing from feral bees, corellas and galahs.



Since 2001 a Recovery Team was convened by CALM, and Birds Australia has operated a Carnaby's Black Cockatoo Recovery Project to raise awareness of the cockatoo's plight, identify and monitor breeding sites and improve breeding and feeding habitat within the Wheatbelt.



Carnaby in flight. © Dave Manson.

A new project funded by an anonymous donation to Birds Australia WA, and supported by WWF-Australia, Birds Australia WA, and the Department of Conservation and Land Management now aims to determine the population and spatial distribution of birds on the Swan Coastal Plain and identify habitat requirements. This critically important baseline information is currently-lacking and will assist with conservation planning in the rapidly developing Swan region.

'Great Cocky Count'
Volunteers needed –
Sunday 12 February 2006

If there is a patch of bush near you, you too could be a part of the 'Great Cocky Count'. The project will identify critical feeding habitat for the cockatoos, and record food preferences within the region.



REGIONAL NEWS

WESTERN AUSTRALIA

For good estimates of the population in this region, we require as many volunteers over as extensive an area of the Plain as possible. We ask volunteers, including 'Friends' groups, to get involved and survey local parks, reserves and home gardens anywhere on the Plain from Gingin to Bunbury.

For Carnaby's, non-breeding areas are as critical to long-term survival as breeding areas. Recently, a survey for the cockatoos was trialed with the assistance of over 80 teams, and about 130 volunteers at various locations on the Plain.

The next survey is on **Sunday 12 February 2006** from 4.30 to 7.00pm and will involve observing for cockatoos, counting birds, their flight direction and activity at particular locations. Future surveys are planned for **Sunday 26 March** and **Sunday 14 May 2006**, so put those dates in your diaries! Information about the surveys, registration and forms are available on the website at www.carnabyscockatoo.org. Food plant record forms are also available from the website.

The survival and recovery of Carnaby's cockatoo is inextricably linked to the survival

of its habitat – both in breeding areas in the Wheatbelt and non-breeding areas such as the Swan Coastal Plain. However, with increasing public awareness and support, and future conservation planning based on good information, there is still hope that Carnaby's cockatoos will thrive.

For more information about the upcoming surveys or to download forms, see www.carnabyscockatoo.org. To find out other ways to become involved, contact Bansi Shah, Swan Coastal Coordinator, Birds Australia WA b.shah@birdsaustralia.com.au or 0427 707 047.

COCKATOOS

The 'Great Cocky Count' Can you help?



Once numerous in WA, the enigmatic and highly mobile Carnaby's Black-Cockatoo (*Calyptrorhynchus latisrostris*) is now listed as endangered, with populations declining dramatically due to land clearing for urban development in Perth and for agriculture in regional areas. The last 45 years has seen a 50% decrease in the species' range and abundance.

The life history of this distinctive cockatoo makes it extremely vulnerable to threats resulting from human activities. Pairs bond for life, and use large hollows in Eucalypt trees to produce just one chick per year. Hollows may not form in those trees for 120–150 years and competition for hollows is increasing from feral bees, corellas and galahs. Clearing of feeding habitat, for example on the Swan Coastal Plain, continues to be a threat.

Carnaby's cockatoos are believed to breed mostly in the wheatbelt, returning to coastal and near coastal areas from late December to July. The birds feed on a large variety of plants including Proteaceous species (e.g. banksia, dryandra and grevillea), marri nuts, and a range of introduced species notably pine cones.

Since 2001, when a Recovery Team was convened by CALM, Birds Australia has operated a Carnaby's Black-Cockatoo Recovery Project to raise awareness of the cockatoo's plight, identify and monitor breeding sites and improve breeding and feeding habitat within the wheatbelt. A new project now aims to determine the population and spatial distribution of birds on the Swan Coastal Plain, and identify critical habitat requirements. This critically important baseline information is currently-lacking and will assist with conservation planning in the rapidly developing Swan region. Currently, key partners in this project are Birds Australia WA, the Department of Conservation and Land Management and WWF-Australia.

When: Sunday 12 February, 4.30–7.30pm

What: Counting Carnaby's cockatoos on the Swan Coastal Plain.

Why: To see how many there are to plan for the future conservation needs for this endangered species in the Swan Region.

Where: Good vantage points within local parks, reserves & home gardens on the Swan Coastal Plain you may count cockatoos at your home, or go to another location. Survey boundaries are listed below:

- Northern Guilderton to Gingin (survey south of
- Gingin Brook Road) Eastern Gingin to Pinjarra (survey west of Brand Hwy, Muchea East Rd, Great
- Northern Hwy, Roe Hwy, Tonkin Hwy, Albany Hwy, South Western Hwy) Southern Bunbury (survey west and North of South Western Hwy)

Who: Anyone! If you are part of a 'Friends' group, why not do your Reserve!

How: Email your details and preferred survey location to your Regional Volunteer Coordinator.

You can download the form, including instructions, from the website at www.birdsaustralia.com.au (select Carnaby's from quick menu).

The next surveys are planned for Sunday 12 February, Sunday 26 March and Sunday 14 May 2006 so make a note in your diaries!

There will also be a Cocky Day on Sunday 19 March at Yanchep National Park as part of Conservation Week so come along if you can. Details will be available on the web.

For further information or to become more involved (e.g. data management, vegetation surveys, etc), contact: Bansi Shah, Swan Coastal Coordinator, Carnaby's Black-Cockatoo Recovery Project, Birds Australia WA. Email: b.shah@birdsaustralia.com.au, Tel: 0427 707 047, web: www.birdsaustralia.com.au

Have a date with Carnaby's Cockatoo: Sunday 26 March

By Bansi Shah

"What great birds they [Carnaby's Cockatoos] are! They're real larrikins, and often remind me of adolescents - they're big, very noisy, very very messy... but we love them anyway!"

Carnaby's cockatoo observer

Birds Australia WA's new research project on the Swan Coastal Plain aims to determine how many Carnaby's Black-Cockatoos there are, where they are, and to identify important habitat for the birds. Information from this project will assist with conservation planning in the rapidly developing Swan region.

Once numerous in WA, the lively and highly mobile Carnaby's Black-Cockatoo (*Calyptorhynchus latisrostris*) is now listed as endangered under both State and Commonwealth legislation. Populations are declining dramatically due to land clearing for urban development in Perth and for agriculture in regional areas. The last 45 years has seen at least a 50% decrease in the species' range and abundance.

The life history of this distinctive cockatoo makes it extremely vulnerable to threats resulting from human activities. Clearing of habitat such as on the Swan Coastal Plain continues to be a threat. The birds feed on a large variety of plants including Proteaceous species (banksia, dryandra and grevillea), marri nuts, and a range of introduced species like pine cones.

Any suitable feeding and breeding habitat that remains for the Carnaby's is frequently fragmented, and often degraded by soil salinity, weed invasion and dieback. Feeding habitat is often so

far away from nesting sites that the growth rate and survival of nestlings is significantly reduced.

Carnaby's cockatoos are believed to breed mostly in the Wheatbelt, returning to coastal and near coastal areas from late December to July. Pairs bond for life and use large hollows in Eucalypt trees to produce just one chick per year. Breeding habitat has also been destroyed by the loss of old, hollow-bearing trees, many of which continue to be used by Carnaby's even after the tree has died. Hollows may not form in those trees for 120 - 150 years and competition for hollows is increasing from feral bees, corellas and galahs.

'Great Cocky Count' volunteers urgently needed - Sunday 26 March (3.30 - 6.00pm)

For good estimates of the population in this region, we are conducting surveys in March and May, and urgently require as many volunteers over as extensive an area of the Plain as possible. The trial survey in December ran smoothly with 130 participants and the first public survey in February is set to be highly successful, attracting over 200 volunteers from Gingin to Bunbury.

If there is a patch of bush near you, you too could be a part of the 'Great Cocky Count'. Anyone can participate, surveying from good vantage points anywhere on the Plain from Gingin to Bunbury within local parks, reserves and home gardens. Survey forms, Volunteer Coordinator details and further information can be obtained from the website listed below.

Vegetation survey volunteers needed - variable timing

Vegetation surveys aiming to identify important habitat for Carnaby's Cockatoos are currently being planned. Surveys will be conducted in bush across the Swan Coastal Plain. Please check the website for the latest information. The feeding patterns and preferences of Carnaby's Cockatoo on the Plain are currently unknown. Food plant record forms are therefore available on the website for you to fill out anytime you see one feeding.

For Carnaby's, non-breeding areas are as critical to long-term survival as breeding areas. The survival and recovery of Carnaby's cockatoo is inextricably linked to the survival of its habitat - both in breeding areas in the Wheatbelt and non-breeding areas such as the Swan Coastal Plain. However, with increasing public awareness and support, and future conservation planning based on good information, there is still hope that Carnaby's cockatoos will fly well into the future.

The next bird surveys are on **Sunday 26 March 2006** (3.30 to 6.00pm) and **Sunday 14 May 2006** (3.00 - 5.30pm) and will involve observing for cockatoos, counting birds, their flight direction and activity at particular locations. Information about the surveys, registration with volunteer coordinators (Jacqui, volunteers@carnabyscockatoo.org, 0428 946 001) and forms are available on the website at www.carnabyscockatoo.org. To find out other ways to become involved, contact Bansi Shah, Swan Coastal Coordinator, Birds Australia WA on b.shah@birdsaustralia.com.au.

CARNABY'S BLACK-COCKATOOS ON THE SWAN COASTAL PLAIN: WE NEED YOUR HELP!



"What great birds they [Carnaby's Black-Cockatoos] are! They're real larrikins, and often remind me of adolescents - they're big, very noisy, very, very messy... but we love them anyway!"

*Carnaby's Black-Cockatoo
observer*

Birds Australia WA's new research project on the Swan Coastal Plain aims to determine how many Carnaby's Black-Cockatoos there are, where they are, and to identify critical habitat for the birds. Information from this project will assist with conservation planning in the rapidly developing Swan Region.

Once numerous in WA, the enigmatic and highly mobile Carnaby's Black-Cockatoo (*Calyptorhynchus latirostris*) is now listed as endangered under both State and Commonwealth legislation. Populations are declining dramatically due to land clearing for urban development in Perth and for agriculture in regional areas. The last 45 years has seen a 50% decrease in the species' range and abundance.

Any suitable habitat that remains for the Carnaby's is fragmented, and often degraded by soil salinity and weed invasion. Feeding habitat is often so far away from nesting sites that the growth rate and survival of nestlings is significantly reduced.

The life history of this distinctive cockatoo makes it extremely vulnerable to threats resulting from human activities. Clearing of habitat such as on the Swan Coastal Plain continues to be a threat. The birds feed on a large variety of plants including proteaceous species (Banksia, Dryandra and Grevillea), Marri nuts, and a range of introduced species like pine cones.

Carnaby's Black-Cockatoos are believed to breed mostly in the



Two Carnaby's Black-Cockatoo males.

Photo courtesy John Lauri



Carnaby's Black-Cockatoo
Photo courtesy Eleanor Adams

Wheatbelt, returning to coastal and near coastal areas from late December to July. Pairs bond for life and use large hollows in eucalypt trees to produce just one chick per year. Breeding habitat has also been destroyed by the loss of old, hollow-bearing trees. Hollows may not form in those trees for 120 – 150 years and competition for hollows is increasing from feral bees, corellas and Galahs.

'Great Cocky Count'

For good estimates of the population in this region, we urgently require as many volunteers over as extensive an area of the Swan Coastal Plain as possible. If there is a patch of bush near you, you

too could be a part of the 'Great Cocky Count'. Anyone can participate, surveying from good vantage points anywhere from Gingin to Bunbury within local parks, reserves and home gardens. Survey forms, volunteer coordinator details and further information can be obtained from the website listed below.

Vegetation survey volunteers needed—variable timing

Vegetation surveys aiming to identify critical habitat for Carnaby's Black-Cockatoos are currently being planned. Surveys will be conducted in bush across the Swan Coastal Plain. Please check the website for the latest information. The feeding habits and preferences of Carnaby's Black-Cockatoo on the coastal plain are currently unknown. Food plant record forms are therefore available on the website for you to fill out anytime you see one feeding.

For Carnaby's, non-breeding areas are as critical to long-term survival as breeding areas. The survival and recovery of the cockatoo is inextricably linked to the survival of its habitat—both in breeding areas in the wheatbelt and non-breeding areas such as the Swan Coastal Plain. However, with increasing public awareness and support, and future conservation planning based on good information, there is still hope that Carnaby's Black-Cockatoos will again blacken the sky as they fly overhead.

The next bird surveys are on **Sunday 26 March 2006** (3:30 to 6:00 pm) and **Sunday 14 May 2006** (3:00 – 6:00 pm) and will involve observing for cockatoos, counting birds, their flight direction and activity at particular locations. Information about the surveys, registration with volunteer coordinators (Jacqui, <volunteers@carnabyscockatoos.org>, 0428 946 001) and forms are available on the website at <www.carnabyscockatoo.org>. To find out other ways to become involved, contact Bansi Shah, Swan Coastal Coordinator, Birds Australia WA on <b.shah@birdsaustralia.com.au>.

Bansi Shah

Carnaby's cockatoos: how many and what do they eat?

By Bansi Shah

We received approximately 220 forms back from the 'Great Cockey Count' survey on 12 February, with more than 400 people participating. Individual flocks as large as 300 were reported by several people, with the highest number of birds observed being close to 500 in the northern parks. As can be expected, the largest flocks were seen in and around the large northern and southern parks, including pine plantations.

More volunteers are needed for the 14 May 'Great Cockey Count' on the Swan Coastal Plain from Gingin to Bunbury. Call 0428 946 001 to register for the 'Great Cockey Count'. For further information and to download 'Cockey Count' and feeding forms, visit www.carnabyscockatoo.org.

Right: Two male Carnaby's cockatoos (Calyptorhynchus latirostris). (Photo: John Lauri)



Great Cocky Count's lucky third

by Rhianna King

IF you notice people standing, mouths open, a clipboard in hand, looking at the sky next month, there could be a good explanation for what you see.

They will probably be involved in the third and final Great Cocky Count being organised by Birds Australia's Carnaby's Black-Cockatoo Recovery Project. The project is collecting information about the population of Carnaby's cockatoos in the State's south-west.

Swan Coastal Coordinator for Birds Australia, Banshi Shah, said more than 220 surveys were conducted from the first survey area from Gingin to Bunbury from 4.30 to 7pm on 12 February. The second survey was held on 26 March, and the third will be held on 14 May.

"With survey forms in hand, the volunteers trekked out to vantage points within allocated areas to count Carnaby's cockatoos so we can get a snapshot of the population, which will help estimate the population on the Swan Coastal Plain.

"Feeding information collected will help determine what the birds are eating and areas of important habitats," she said.

"Twenty-five per cent of surveys documented that birds, in flocks as large as 200 to 300 birds, were seen during the survey period."

CALM Senior Zoologist and Carnaby's cockatoo Recovery

Team member, Peter Mawson, said WA's two white-tailed black cockatoos, Carnaby's and Baudin's, were both listed as endangered.

Carnaby's cockatoos are threatened by extensive land clearing resulting in loss and fragmentation of both breeding and feeding habitat, competition for nesting hollows by galahs, corellas and feral honey bees, illegal shooting by orchardists and poaching.

"The Great Cocky Count is important to the conservation of the Carnaby's cockatoo because knowing how many there are, and what they eat, will help us determine how developments on the Swan Coastal Plain are affecting, or are likely to affect, the cockatoos. Armed with this information we can all make much better plans for the future," Peter said.

"The only way to get this type of information was to enlist the help of the community."

For more information about how to get involved, visit the Birds Australia project's website at www.carnabyscockatoo.org or call volunteer coordinator Jacqui Purvis on 0428 946 001.



Banshi Shah from Birds Australia with Rennie, a Carnaby's cockatoo. Photo - Helen Pinnan.

CARNABY'S BLACK-COCKATOO ON THE SWAN COASTAL PLAIN OF WESTERN AUSTRALIA:



Population & Food Resource Estimation

The Carnaby's Black-Cockatoo Swan Coastal Plain project began in October 2005 with the broad aims of determining how many Carnaby's Black-Cockatoos there are, where they are, what they feed on and what food resources are available to them on the Plain from Gingin to Bunbury.

The 'Great Cocky Count' was organised to help answer the question of bird numbers. The survey involved counting Carnaby's Black-Cockatoos from anywhere on the Plain in parks, reserves and home gardens on particular dates within specified time periods in February, March and May 2006. The counts have been highly successful in receiving support from both the Birds Australia membership and the general public. Over 450 people have been involved, with many volunteers participating in all the counts. The February count yielded high numbers, with the largest reported flock at almost 500 birds. In March, a greater percentage of people saw birds, with several reporting flocks of well over 500 birds. Data for the May count are not yet available.

The project is also looking at numbers of Carnaby's Black-Cockatoos at roosting sites and what birds feed on when on the Swan Coastal Plain. During winter when the breeding birds return to the wheatbelt, the project will focus on vegetation surveys to determine food resources available to Carnaby's on the Plain.

To find out how you can get involved in the project, including providing assistance with data management, contact Bansi Shah on <b.shah@birdsaustralia.com.au> or 0427 707 047. For further information about the project, see <www.carnabyscockatoo.org>.

Bansi Shah



A flock of Carnaby's Black-Cockatoos at Yanchep.
Photo courtesy Eric Lehmann

Appendix 8: Abstract for presentation at Birds Australia National Congress, Albany 2006.

Carnaby's Black-Cockatoo: Abstract for Spoken Presentation BA Congress, Albany, October 2006



Title:

Carnaby's Black-Cockatoo (*Calyptorhynchus latirostris*) on the Swan Coastal Plain.

Author:

Bansi Shah

Affiliations:

Birds Australia WA

In partnership with: CALM, WWF-Australia

Contact details:

Bansi Shah

Swan Coastal Coordinator

Carnaby's Black-Cockatoo Recovery Project

167 Perry Lakes Drive, FLOREAT WA 6014

Tel: 0427 707 047

Email: b.shah@birdsaustralia.com.au

Web: www.carnabyscockatoo.org

Abstract

Once numerous in WA, the endemic & highly mobile Carnaby's black-cockatoo (*Calyptorhynchus latirostris*) is now listed as endangered, with populations declining dramatically due to land clearing for agriculture in regional areas and more recently for urban development on the Swan Coastal Plain (SCP). The last 45 years has seen an estimated 50% decrease in the species' range and abundance. This project was therefore aimed at collecting critically important baseline information to assist future conservation planning in the rapidly developing Swan region. The primary objectives of the project were to provide a population estimate of the cockatoo on the SCP and to collect information regarding used and important sites for Carnaby's cockatoo. A pilot survey was conducted to test the most appropriate, practical and repeatable method of counting. On successful completion of the pilot survey, three surveys were conducted in February, March and May 2006, involving both experienced observers and the general public. Surveys collected information on site location, site type, numbers of cockatoos and time at which they were seen. The surveys were conducted on specified dates within set time periods anywhere on the SCP within set boundaries. A large number of volunteers were recruited, with 243, 153 and 121 sites covered for each survey respectively. The presence of Carnaby's cockatoos over the three surveys was recorded at 26% to 43% of observation sites. In addition to a population estimate, major outcomes of this study include testing of census methods and identification of significant constraints involved with studying a highly mobile bird species with complicated daily movement patterns and hence complex conservation needs. Avenues of further investigation include targeted studies on the food resources and habitat availability and requirements of these birds on the SCP, which will in turn assist conservation managers in planning for their future.

