SYSTEMATIC VERTEBRATE FAUNA SURVEY PROJECT

STAGE I–VERTEBRATE FAUNA SURVEY IN THE SOUTH EAST QUEENSLAND BIOREGION

QUEENSLAND CRA/RFA STEERING COMMITTEE

SYSTEMATIC VERTEBRATE FAUNA SURVEY PROJECT

STAGE I–VERTEBRATE FAUNA SURVEY IN THE SEQ BIOREGION

FOREST ASSESSMENT UNIT
QUEENSLAND DEPARTMENT OF ENVIRONMENT

QUEENSLAND CRA/RFA STEERING COMMITTEE

For more information contact:

Regional Forest Assessments, Department of Natural Resources

Block C, 80 Meiers Road
INDOOROOPILLY QLD 4068

phone: 07 3896 9836
fax: 07 3896 9858

Forests Taskforce, Department of Prime Minister and Cabinet

3-5 National Circuit
BARTON ACT 2600

phone**:** 02 6271 5181
fax: 02 6271 5511

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Project Leader
Teresa Eyre

Field Team Leaders
David Hannah (DoE)
George Krieger (DoE)
Martin Schulz (DNR)

Field Team Members
DoE FAU Teams
Murray Haseler
Barney Hines
Richard Johnson
Melanie Venz
Greg Ford
Paula Randall

DNR Forest Wildlife team
Luke Hogan
Ben Hamley
Michael Mathieson
Anita Smyth
Nadya Lees
Adam Fletcher
James Cotterell
Gordon Agnew

Database development
Teresa Eyre
Tracy Bell
Luke Hogan
Paula Randall

Report Preparation and Authors
Teresa Eyre
George Krieger
Melanie Venz
Murray Haseler
Barney Hines
David Hannah
Martin Schulz

Hair and Scat Analysis
Barbara Triggs

Microbat Ultrasonic Call Analysis
Maritza de Oliveira, Forest Wildlife, DNR
Greg Ford, FAU, DoE

GIS Spatial Data and Support
Jane Wickers, FAU, DoE
Doug Ward, DNR

Map Production
Melanie Venz
Teresa Eyre

External datasets
Teresa Eyre (arboreal marsupials)
Harry Hines (frogs)
Geoff Smith (plumed frogmouth)

Data entry
The DoE team
Tracy Bell DNR

Contributions to and editing of Species Accounts

Ian Gynther (DoE)	(fig-parrot, mammals)	Richard Johnson (DoE)	(birds)
Harry Hines (DoE)	(frogs)	Ed Myer (UQ)	(frogs)
Martin Schulz (DNR)	(bats, red goshawk, square-tailed kite)	David Stewart (DoE)	(eastern bristlebird, rufous scrub-bird)

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SUMMARY

This report has been prepared for the joint Commonwealth/State Steering Committee which oversees the Comprehensive Regional Assessment (CRA) of forests in the South East Queensland CRA region.

The Comprehensive Regional Assessment provides the scientific basis on which the State and Commonwealth governments will sign a Regional Forest Agreement (RFA) for the forests of the South East Queensland (SEQ) Bioregion. This agreement will determine the future of the region's forests, providing a balance between conservation and ecologically sustainable use of forest resources.

The Systematic Vertebrate Fauna Survey Project was undertaken to obtain systematic data on the distribution of vertebrate species (excluding fish) across the SEQ Bioregion and the Blackdown Tableland area, and fill in spatial gaps where no data was available. This project represents the first large scale attempt to systematically survey vertebrate fauna species in southern Queensland. The SEQ bioregion was stratified by grouped modelled Regional Ecosystem types and a geological coverage to ensure representative sampling of major environmental and geographical gradients. Three field survey teams were collecting data from March 1997 to December 1997. In all, 36 forest areas were surveyed, encompassing 39 survey trips, and a total number of 267 systematic sites were surveyed for bats, small and large ground mammals, arboreal mammals, diurnal and nocturnal birds and herpetofauna. Further sites within the survey areas were surveyed using non-standard techniques. Further systematic data was obtained from external sources, adding a further 78 frog survey sites, 15 plumed frogmouth survey sites, and 60 arboreal mammal survey sites.

Using standard and non-standard methods, the CRA Systematic Vertebrate Fauna Survey Project recorded 36 amphibian species, 92 reptile species, 296 diurnal bird species, 10 nocturnal bird species, 19 small terrestrial mammal species, 11 macropod species, three predator species, four ungulate species,, ten arboreal mammal species, five megachiropteran bat species and 27 microchiropteran bat species. A number of records obtained during the survey were regionally significant, including extensions to the previously known range of priority species such as the collared delma *Delma torquata*, Nangur skink *Nangur spinosa*, and eastern pebble-mound mouse *Pseudomys patrius.*

1. INTRODUCTION

The systematic vertebrate fauna survey project was one of several projects of the Comprehensive Regional Assessment (CRA) conducted throughout the South East Queensland (SEQ) bioregion and the Blackdown Tableland. The main objective of the CRA process was to identify the natural, cultural, economic and social values of the forest's throughout Australia. The assessments will form the basis for the negotiation of Regional Forest Agreements (RFAs) between the Commonwealth and State governments.

The broad objective of the CRA systematic vertebrate fauna survey project was to undertake field surveys to provide systematic data on the distribution and abundance of vertebrate forest fauna (excluding fish) within the SEQ bioregion and the Blackdown Tableland for the assessment component of the CRA. This project represents the first large scale, standardised and systematic survey of vertebrate fauna in southern Queensland, and will provide the basis on species' distributions throughout the SEQ bioregion.

1.1 SURVEY REGION

The area defined as the survey region for the CRA systematic fauna survey project included the Southeast Queensland bioregion and the Blackdown Tableland (Figure 1.1). The Southeast Queensland (SEQ) Bioregion covers approximately 6 600 000 ha along the coastal strip and adjacent hills and ranges from the New South Wales border north to Gladstone (Figure 1.2). The Blackdown Tableland area, covering approximately 47 500 ha, is disjunct from the SEQ bioregion, and is located in central Queensland west of Rockhampton.

The SEQ bioregion is characterised by moderate to high rainfall (800-1500 mm per annum), and the major physiographical features include coastal plains of varying width, and hills and ranges (Young 1998). The bioregion supports many vegetation types including rainforests, vine thickets, tall open forests, eucalypt open forest and woodlands. Though climatically similar to the SEQ bioregion, the Blackdown Tableland is an undulating plateau of sandstone approximately 600m above the surrounding plains and is bounded by precipitous cliffs. Eucalypt woodlands, tall open forest and heath cover the tableland. A number of flora species are endemic to the Tableland, such as *Eucalyptus sphaerocarpa*.

Within the SEQ bioregion and the Blackdown Tableland, surveys were restricted to forests under crown tenure, specifically state forests, timber reserves and national parks due to time and logistic constraints.

1.2 OBJECTIVES OF THE CRA SYSTEMATIC FAUNA SURVEY PROJECT

Specifically, the objectives of the CRA systematic fauna survey in the SEQ bioregion were:

- To assess the relative abundance and relative diversity of vertebrate species (excluding fish) throughout state forests, timber reserves and national parks within the SEQ bioregion.
- Increase present knowledge on the distribution and habitat preferences of vertebrate species.
- To provide information on the distribution and habitat requirements of vertebrate species to the CRA Response to Disturbance project and to assist in the development of forest management Codes of Practice.

1.3 LIMITATIONS

Due to the rigid time constraints (ten months to design and develop survey methodology and database, collect data from the field, data entry, data manipulation and report writing) the following limitations were evident during the project;

- Most survey effort was expended during one season (winter), which may influence the detection of particular species sensitive to seasonal changes (eg. frogs and migratory species).
- Relatively few sites could be sampled (compared with other RFA regions such as East Gippsland and North East New South Wales which have been conducting systematic surveys for many years).

Nomenclature used in this report

Nomenclature in this report follows the Department of Environment WILDNET Fauna Species Taxonomy list current to February, 1998.

In the first reference to a species, both the scientific and common names are provided. Thereafter, only the scientific names for frogs, reptiles and mammals, and common names for birds, are used.

Gaps in the known taxonomy of some microchiropteran bat species meant that individuals of a particular genus were not identified to species level, pending outcomes of electrophoresis studies currently being conducted by T. Reardon of the South Australian Museum. Microchiropteran bat genera which were not identified to species level included *Myotis*, *Mormopterus* (other than the *M.beccarii*), and *Scotorepens* (other than *S.balstoni* and *S.orion*).

Appendix 1 lists all vertebrate fauna species recorded during the CRA systematic fauna survey project by common and scientific name.

FIGURE 1.1 LOCATION OF THE SEQ BIOREGION AND BLACKDOWN TABLELAND WITHIN QUEENSLAND

FIGURE 1.2 THE SURVEY REGION: SEQ BIOREGION AND BLACKDOWN TABLELAND

2. METHODS

2.1 SURVEY DESIGN

2.1.1 Stratification of the SEQ Bioregion

Modelled regional ecosystems and a geological/geomorphological variable known as landzones (Young 1998) were used as the primary environmental variables for the stratification of the SEQ Bioregion. The modelled regional ecosystem mapping (D. Ward, DNR, unpubl. data) was used in lieu of mapped regional ecosystems or vegetation because it was the only digital coverage available at an appropriate scale (100m grid resolution) depicting forest types for the Bioregion.

The modelled regional ecosystems used in the stratification process were derived by grouping individually modelled tree species distributions into predefined regional ecosystems. Individual tree species distributions were modelled using environmental domain analysis. This approach uses statistical techniques to develop a relationship between site information on species abundance and spatial information of factors such as light, temperature, moisture and nutrients that influence plant growth. This statistical relationship was then used to predict the spatial extent of the species. The 30 species modelled and used for this exercise showed mapping accuracy's ranging from 60% to 90% with an average of 75% accuracy. The suite of species used in the modelling represented the more commonly occurring species across the landscape. Modelling of species with limited distributions was not conducted due to a lack of site data.

The individual modelled tree species distributions were then overlayed and the resulting combinations of species were grouped into predefined regional ecosystems developed by the Department of Environment (Young 1998). This process of grouping species combinations into predefined regional ecosystems resulted in the ability to broadly define the spatial extent of 22 groupings of regional ecosystems in the SEQ Bioregion (Table 2.1). Since not all possible combinations of tree species were modelled, the final coverage of modelled regional ecosystems did not include ecosystems based on species with restricted distributions.

To reduce the number of possible strata, and ensure each would be large enough to allow adequate sampling, the 22 modelled regional ecosystems were grouped into nine broad types (Table 2.1). This grouping was based on classifying the ecosystems into a wet and dry continuum. For example all high altitude wet to moist regional ecosystems were grouped, even though they comprise different species mixes.

The land zone classification used in the stratification of the SEQ bioregion followed that of Young (1998). Table 2.2 describes the eight land zones used in the stratification. Of the possible 80 strata units (ie. eight regional ecosystems x 10 land zones), a total of 71 existed throughout the SEQ bioregion.

TABLE 2.1 REGIONAL ECOSYSTEM GROUPS USED FOR STRATIFICATION

Regional Ecosystems (Young 1998)	Description	Grouped Regional Ecosystem code used for stratification
12.2.1, 12.2.2, 12.2.3, 12.3.1, 12.8.3, 12.8.4, 12.8.5, 12.8.13, 12.8.18, 12.8.21, 12.8.22, 12.9/10.15, 12.9/10.16, 12.11.1, 12.11.4, 12.11.10, 12.11.11, 12.11.12, 12.11.13, 12.12.1, 12.12.13, 12.12.16, 12.12.17	Rainforest types, including microphyll and notophyll rainforest	1 Wet and dry rainforest
12.8.9	*Eucalyptus grandis, E.microcorys, Lophostemon confertus* TOF with rainforest understorey	2 High altitude wet to moist tall open forests
12.8.8, 12.11.2, 12.12.20	*E.saligna* TOF with rainforest understorey	2
12.8.1, 12.9/10.14, 12.12.2	*E.pilularis* and or *E.campanulata* TOF with shrubby understorey	2
12.2.4	*Syncarpia hillii, L.confertus* TOF with rainforest understorey	2
12.2.8	Mixed TOF with shrubby understorey, *E.intermedia, E.resinifera, S.glomulifera, E.microcorys, E.pilularis, L.confertus*	3 Central coast wet forests
12.3.2, 12.11.16, 12.12.4	*E.cloeziana, E.acmenoides, E.microcorys, E.grandis* TOF	3
12.5.6, 12.11.3, 12.12.15,	Mixed TOF with shrubby understorey, *E.microcorys, E.acmenoides, E.propinqua, E.biturbinata, L.confertus, E.siderophloia*	4 Moist mixed eucalypt tall open forests
12.3.11, 12.3.12 12.5.8, 12.5.12, 12.9/10.1, 12.9/10.9, 12.12.9, 12.12.24	*C.intermedia, E.umbra, E.exserta, C.trachyphloia, Angophora leiocarpa, E.hallii, Melaleuca* spp. woodland with grassy understorey	5 Coastal and sub coastal dry open forests and woodlands
12.5.1, 12.5.2, 12.12.23, 12.12.27	*E.tereticornis* or *C.trachyphloia* and/or *C.citriodora, ith E.crebra, E.longirostrata, C.intermedia, E.major* mixed open forest	5
12.2.5,12.2.6, 12.2.9, 12.2.11,12.2.12, 12.3.5, 12.5.3, 12.9/10.4	Open forest/woodland with *E.racemosa* prominent	6 Coastal open forest to woodlands and wallum forest types
12.3.4,12.3.5,12.3.6,12.5.4, 12.9/10.12, 12.12.12	*Melaleuca quinquenervia* TOF to tall woodland with *L.suaveolens*, *E.robusta*, *E.tereticornis*	6
12.2.7,12.2.10,12.2.12, 12.3.13, 12.3.14,12.5.10	*Melaleuca*/*Banksia* low woodlands with some mallee eucalypts	6
12.5.11	*Syncarpia glomulifera* and/or *C.trachyphloia*, *E.acmenoides* tall woodland	6

Table 2.1 continued over page.

Table 2.1 REGIONAL ECOSYSTEM GROUPS USED FOR STRATIFICATION (CONTINUED)

Regional Ecosystems	Description	Grouped Regional

(Young 1998)		Ecosystem code used for stratification
12.9/10.2, 12.9/10.19, 12.11.6, 12.12.5, 12.12.25	*Corymbia citriodora* or *C.henryi* dominant with ironbark spp.	7 Spotted Gum *C.citriodora* dominant to mixed eucalypt forests
12.5.7, 12.8.24, 12.9/10.3, 12.9/10.5, 12.11.5, 12.11.17, 12.11.18, 12.11.19, 12.12.3, 12.12.11, 12.12.28	Mixed TOF, *C.citriodora* prominent	7
12.9/10.21	Mixed open forest with *C.citriodora, E.crebra, E.longirostrata, E.melanoleuca, E.cloeziana, E.trachyphloia*	7
12.3.10 12.8.23	*E.populnea* with *E.tereticornis* grassy woodland/tall woodland	8 Western dry mixed woodlands with ironbarks
12.5.5, 12.7.1, 12.7.2, 12.9/10.7, 12.9/10.8, 12.11.7, 12.11.8, 12.11.15, 12.12.7, 12.12.8	*E.crebra*/*E.melanophloia* grassy woodland, *E.dura* woodland to open forest and/or *C.trachyphloia*	8
12.9/10.23, 12.9/10.24	*Eucalyptus melanoleuca or E.suffulgens* tall woodland with *E.acmenoides*, *C.trachyphloia*	8
12.3.3, 12.3.7, 12.8.16, 12.8.17, 12.8.25	*E.tereticornis* open forest/woodland with *C.intermedia/ E.crebra/ E.moluccana/ E.melanophloia*	9 Southern dry mixed eucalypt open forests
12.8.14, 12.9/10.17, 12.11.9	Mixed TOFs with *Corymbia citriodora*, *E.siderophloia*, *E.eugenoides, E.tereticornis, E.melliodora, E.biturbinata, Allocasuarina torulosa* open forest with grassy understorey.	9
12.3.9, 12.8.2, 12.8.10, 12.8.11, 12.8.12, 12.8.20, 12.11.14, 12.12.6, 12.12.14, 12.12.21	Regional ecosystems not represented in modelled coverage due to restricted range of species. Includes southern restricted range species *E.obliqua*, *E.nobilis, E.oreades, E.laevopinea, E.dunnii,* and *E.clarksoniana*, *E.montivaga*	
12.1.1, 12.1.2, 12.1.3, 12.2.13, 12.2.14, 12.2.15, 12.3.8, 12.5.9, 12.8.6 12.8.7, 12.8.19, 12.9/10.6, 10.10, 10.11, 10.22, 12.12.10, 12.12.19	Non eucalypt forest and non forest types	

TABLE 2.2 LAND ZONE CLASSES OCCURRING IN THE SEQ BIOREGION USED IN THE STRATIFICATION (AFTER YOUNG 1998)

Land Zone Class	Description
1	Quaternary saline alluvials
2	Quaternary dune sands and coastal sediments
3	Alluvial plains
5	Cainozoic sand plains and remnant surfaces with deep red soils
8	Cainozoic igneous rocks; some limited valley basalt flows
9/10	Coarse and fine grained sedimentary rocks
11	Permian age and older sedimentary rocks that have been subject to folding and metamorphism
12	Pre-Cainozoic igneous rocks

Blackdown Tableland

Regional ecosystems or landzones were not digitally available at the time of stratification for the Blackdown Tableland area, so it could not be stratified with the rest of the Bioregion. Instead, the 1:100 000 Dingo mapsheet vegetation coverage, produced by the DoE Herbarium, was used. Table 2.3 describes the vegetation units which were mapped for the Blackdown Tableland area.

TABLE 2.3 DESCRIPTION OF VEGETATION CODES MAPPED FOR THE BLACKDOWN TABLELAND

Vegetation Mapping Code	Description
10a/10b	TOF to Tall woodland, *Corymbia citriodora*, *Eucalyptus crebra*, or *E.cloeziana*, *E.melanoleuca*, *E.sphaerocarpa*
11	Very TOF to TOF, *Eucalyptus sphaerocarpa*
12	TOF to tall woodland to mid high open woodland, *Corymbia bunites*
13	Very TOF, *Eucalyptus mensalis*
14	Very TOF to tall woodland, *Eucalyptus saligna* ± (*Corymbia intermedia*, *E.mensalis*, *E.sphaerocarpa*)
15	Very tall closed forest, to TOF to mid high open forest, *Eucalyptus melanoleuca*, *E.baileyana*, *Corymbia hendersonii*, *C.bunites*, *E.propinqua*

2.1.2 Site selection and sampling intensity

Between February 1997 and December 1997, 36 stratified survey areas across the SEQ Bioregion and Blackdown Tableland were sampled for vertebrate fauna, including a total number 267 systematic survey sites. Details outlining the process of site selection follows.

Selection of survey areas

Survey areas were initially selected by using a series of gradient directed transects (gradsects), each with a width of 25 km, which were placed over the stratified bioregion to ensure sampling within

strata was represented spatially across the region, since most strata consisted of many geographically separated sub-strata which also need to be sampled. Within the gradsects, survey areas were chosen which contained three or four target strata polygons larger than 100 ha. Survey areas which contained rare strata, and which did not fall within the series of gradsects, were targeted directly. Figure 2.1 illustrates the distribution of the 36 survey areas throughout the SEQ bioregion.

Sampling intensity

Strata which encompassed less than 0.2% of the total forest area were not sampled. Also strata which were not located within the public forest tenure system were not sampled, since surveys were restricted to forest areas within state forest, timber reserve or national park tenure only. Of the 71 existing strata in the SEQ bioregion, 25 each encompassed less than 0.2% of the total forested area, and another three strata existed outside the public forest reserve system. This left a total of 43 strata units available for sampling throughout the SEQ bioregion (excluding Blackdown Tableland). The number of sites to be surveyed within each of the strata units was determined by using an index of sampling intensity based on $\log_2$ of the proportion of total area of each stratum (Table 2.4). This index was then multiplied by three, to ensure at least one systematic gully site, one systematic midslope site and one systematic ridge site were sampled across each stratum. Where time permitted, an extra three systematic sites were surveyed within each available stratum, as replicate sites. Only four strata were not sampled (strata units 24, 46, 53 and 55), due to problems with access. Table 2.5 provides a summary of the survey stratification and number of sites surveyed in the SEQ bioregion.

The number of systematic sites surveyed in Blackdown Tableland was determined by the proportion of the total forest area each of the mapped vegetation units encompassed. Table 2.6 describes the area of vegetation mapping units and sampling effort conducted within the Blackdown Tableland area.

TABLE 2.4 SAMPLING INDEX USED FOR SAMPLING IN THE SEQ BIOREGION (EXCLUDING BLACKDOWN)

% of total area encompassed by strata unit	Sampling Index (No. sites to be sampled)
< 0.2	Not sampled
0.3 - 2.0	1
2.1 - 4.0	2
4.1 - 8.0	3
8.1 - 16	4

FIGURE 2.1 DISTRIBUTION OF THE CRA FAUNA SURVEY AREAS THROUGHOUT THE SEQ BIOREGION AND BLACKDOWN TABLELAND

TABLE 2.5 SUMMARY OF SURVEY STRATIFICATION, AREA OF EACH STRATA UNIT, PERCENT OF TOTAL AREA ENCOMPASSED BY EACH STRATUM, AND NUMBER OF SITES SURVEYED IN SEQ BIOREGION (EXCLUDING BLACKDOWN TABLELAND)

Strata Unit Code	Grouped RE Code	Landzone Code	Total Area (ha)	% TOTAL AREA	Sampling index (SI)	Total Sites to be Sampled (ie. SI x3)	Sites Surveyed	No. of Replicate Sites	Total No. sites Surveyed
2	1	11	46298.5	1.87904	1	3	4	4	8
3	1	12	35658.5	1.44721	1	3	5	4	9
6	1	5	6078.3	0.24669	1	3	3	0	3
7	1	8	51960.1	1.88612	1	3	3	3	6
8	1	9/10	15918.8	0.64607	1	3	4	3	7
10	2	11	18022	0.73143	1	3	3	3	6
11	2	12	46457.9	2.10889	2	6	8	4	12
16	2	9/10	19507.6	0.79172	1	3	4	3	7
17	3	1	10678.8	0.4334	***Outside reserve system***				
18	3	11	22669.8	0.92006	1	3	3	2	5
19	3	12	36131.7	1.46642	1	3	5	3	8
20	3	2	5424.4	0.22015	1	3	3	1	4
21	3	3	8991.9	0.36494	1	3	1	0	1
24	3	9/10	33614.2	1.36424	1	3	0	0	0
26	4	11	128317.3	5.2078	3	9	9	5	14
27	4	12	51275.3	2.08102	2	6	7	4	10
29	4	3	5239.6	0.21265	1	3	1	3	4
32	4	9/10	35388	1.43623	1	3	3	1	4
33	5	1	7145.1	0.28999	***Outside reserve system***				
34	5	11	13137.8	0.5332	1	3	2	0	2
35	5	12	74146.4	3.00926	2	6	1	0	1
36	5	2	17392.9	0.7059	1	3	3	0	3
37	5	3	19632.3	0.79678	1	3	3	2	5
38	5	5	80064.5	3.24944	2	6	6	1	7
40	5	9/10	29799.4	1.20942	1	3	3	0	3
41	6	1	28496.8	1.15655	1	3	3	0	3
44	6	2	16238.4	0.65904	1	3	3	0	3
45	6	3	13837.4	0.5616	1	3	3	0	3
46	6	5	9526.2	0.38662	1	3	0	0	0
48	6	9/10	33009.6	1.3397	1	3	3	0	3
49	7	1	5501.9	0.2233	***Outside reserve system***				
50	7	11	156394	6.3473	3	9	9	3	12
51	7	12	286552.2	11.6298	4	12	12	5	17
53	7	3	18310.2	0.74313	1	3	0	0	0
54	7	5	34120	1.38477	1	3	3	3	6
55	7	8	20401.8	0.82802	1	3	0	0	0
56	7	9/10	200495	8.13715	4	12	12	2	14
58	8	11	205611.7	8.34481	4	12	12	0	12
59	8	12	271279.5	11.01	4	12	12	1	13
62	8	5	16922.7	0.68681	1	3	3	0	3
63	8	8	30073.8	1.22055	1	3	2	0	2
64	8	9/10	119948.1	4.86813	3	9	9	3	12
66	9	11	12243.7	0.49692	1	3	3	0	3
67	9	12	16061.4	0.65186	1	3	3	0	3
70	9	8	70878.8	2.87664	2	6	6	2	8
71	9	9/10	15310.9	0.6214	1	3	2	0	2
TOTAL			**2400165**			**198**	**184**	**65**	**249**

TABLE 2.6 SUMMARY OF SURVEY EFFORT BY MAPPED VEGETATION UNITS, INCLUDING

PERCENT OF TOTAL AREA ENCOMPASSED BY EACH VEGETATION UNIT AND NUMBER OF SITES SURVEYED IN THE BLACKDOWN TABLELAND AREA

Veg mapping unit	Total area (ha)	% Total area	Total no. sites surveyed
10a/10b	75905.7	21.91	3
11	185915.3	53.68	5
12	37512.2	10.83	3
13	4044.7	1.16	2
14	2520.2	0.73	2
15	40446.5	11.67	3

Selection of systematic sites

Transparent overlays showing the distribution of strata were produced at a scale of 1:50 000 for each survey area. Systematic survey sites were then selected by placing the overlays on 1:50 000 Forestry or topographic maps showing established roads, and randomly marking the required number of sites within the target strata directly onto the map. The number of strata sampled during each survey depended upon the complexity of forest types and geology within the survey area. Systematic sites were located more than one kilometer from each other to ensure independence between the sites and, for accessibility reasons, were constrained by the established road network. The team assigned each survey area were given an indication of sampling requirements within each target stratum, ie. whether a gully, midslope or ridge systematic site was required. The site was then selected in the field, as close as possible to the marked site on the Forestry or topographic map, to sample the required topographic position. A 300 x 50 m transect was then marked and measured out following the contour, and a geocode (Australian Map Grid Easting and Northing, which was later converted to decimal degrees) was recorded for the site accurate to 300m using a Global Positioning System (GPS). Figure 2.2 illustrates the distribution of systematic sites throughout the forests of the SEQ bioregion and Blackdown Tableland area.

Surveys were conducted between February and December 1997, and were described as winter surveys if undertaken between April and September, or as summer surveys if undertaken during February and March or between October and December. Table 2.7 provides a summary of the survey areas, including whether the survey was classed as a winter or summer survey, the number of strata and the number of systematic sites surveyed.

FIGURE 2.2 DISTRIBUTION OF CRA SYSTEMATIC FAUNA SURVEY SITES AND FOREST COVER

TABLE 2.7 SUMMARY OF THE SURVEY AREAS VISITED, STRATA AND NUMBER OF SYSTEMATIC SITES SURVEYED

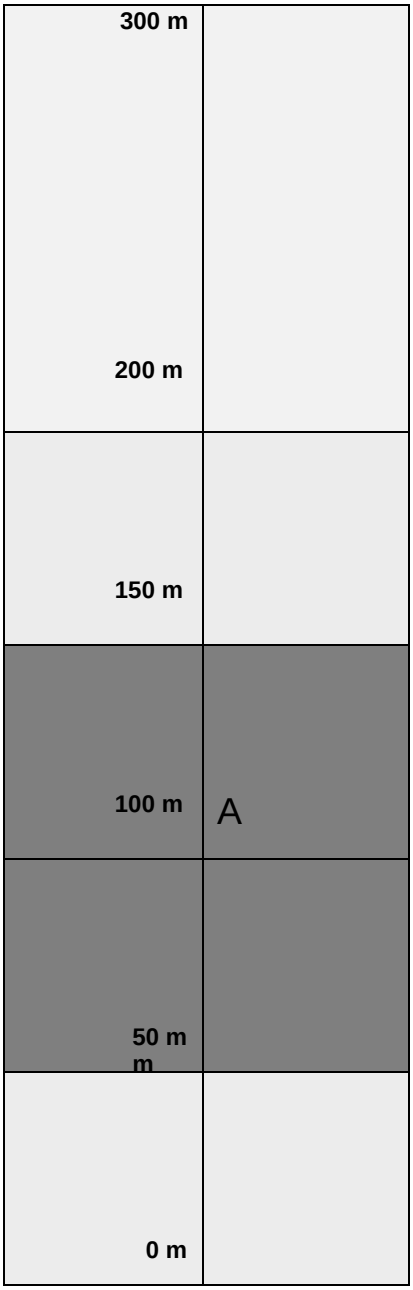
Number	Survey Area	Summer/Winter Survey	No. strata surveyed	No. of systematic sites surveyed
1	Wrattens SF 639	Summer	6	9
2	Oakview SF 220	Summer	2	5
3	Bellthorpe SF 832	Winter	3	8
4	Curra SF 700	Winter	4	7
5	Brooyar SF 82 and King SF 575	Winter	5	6
6	Lockyer SF 616	Winter	3	7
7	Deongwar SF 528	Winter	3	6
8	Mothar Mountain SF 393	Winter	6	6
9	Marodian SF 632	Winter	2	6
10	Grongah SF 67	Winter	2	7
11	Cordalba SF 832	Winter	4	7
12	Bingera SF 840	Winter	2	7
13	Bania SF 381	Winter	2	7
14	Wongi SF 1294	Winter	4	7
15	Many Peaks TR 353	Winter	3	6
16	Watalgan SF 898 & Littabella NP 301	Winter	4	7
17	Bulburin SF 391	Winter	3	7
18	Eurimbula NP 278	Winter	2	7
19	Mapleton SF 1239	Winter	2	7
20	Mt Mee SF 893	Winter	4	7
21	Benarkin SF 283	Winter	3	7
22	Emu Vale SF 401 & Main Range NP 933	Winter	2	7
23	Kroombit Tops SF 316 and NP 435	Winter & Summer	8	14
24	Kandanga SF 546 & Wrattens SF 639	Winter	3	7
25	Conondale Range SF 792 and NP 1100	Winter	5	7
26	Mt Walsh TR 1344 and NP 862	Winter	2	7
27	Cherbourg SF 12	Winter	4	7
28	Great Sandy NP 1238	Winter & Summer	5	15
29	Yarraman SF 289	Winter & Summer	4	9
30	Squirrel Creek SF 343	Summer	6	7
31	Glenbar SF 50	Summer	3	7
32	Goomburra SF 750	Summer	2	5
33	Tarong SF 118	Summer	2	2
34	Warro SF 424	Summer	4	6
35	Numinbah SF 702 & Springbrook NP 465	Summer	3	5
36	Blackdown Tableland SF 175 & NP 181	Summer	6	18

2.2 FIELD SURVEY METHODS

The CRA systematic fauna survey used a range of standard survey methods to obtain data on the abundance, presence/absence and/or presence of priority vertebrate species (excluding fish) throughout the bioregion. At each systematic site a set of standard survey methods was used, and additional standard methods were used if the site was suitable, eg. harp trapping for microbats if a flyway was available on-site. Table 2.8 provides a summary of the set of standard survey methods and effort undertaken at each systematic site during the CRA surveys. Figure 2.3 illustrates the spatial layout of the survey method that was conducted at each systematic survey site.

One or more standard survey methods were also conducted away from the systematic sites at opportunistically chosen sites within each survey area. These sites were referred to as opportunistic sites. Records of species collected during surveys without any standard survey effort expended were recorded as incidental.

FIGURE 2.3 SPATIAL LAYOUT OF EACH SYSTEMATIC SITE 300 X 50 M TRANSECT AREA, SHOWING SURVEY EFFORT



Two 50 x 50 m areas*: Nocturnal herpetofauna search

100 x 50 m area*: Diurnal herpetofauna search

* 200 x 50 m area (above areas combined): Diurnal bird count, Elliott and hair-tube trapping and scat search

100 x 50 m area combined with the above for hand-held spotlighting (total area = 300 x 50m)

A 100 m point: Ultrasonic bat detection and nocturnal bird call playback

TABLE 2.8 SUMMARY OF SURVEY METHODS USED DURING THE CRA SEQ VERTEBRATE FAUNA SURVEY PROJECT

Survey site type	Survey methods	Effort
At each systematic site (Ridge, Gully, Midslope)	Diurnal bird count	Two x 30 minute count within 200x50 m area.
	Diurnal herpetofauna search	One person hour within 100 x 50 m area
	Nocturnal herpetofauna search	One person hour within 100 x 50 m area
	Nocturnal call playback	Calls of powerful, masked and sooty owls played for 3 mins each. (plus plumed frogmouth call in rainforest sites)
	Spotlighting	One person hour within 300 x 50 m area
	Ultrasonic microbat detection	30 minutes
	Hair-tubes	10 @ 20 m along 200 m transect
	'A' type Elliott trapping	25 @ 8 m along 200 m transect; 3 nights
	Predator scat search	Collected from within 300 x 50 m
	Incidental records	Recorded as on-site within 300 x 50 m
Additonal methods at systematic sites where suitable	Dry pitfall line	5 buckets @ 6 m along 30 m drift fence; open for 3 nights
	Harp trapping	Open for 2 nights
Non-standard methods	Mist-netting	No standard effort
	Trip-lining	No standard effort
	Cave and roost searches	No standard effort
	Turtle trapping	No standard effort
	Vehicle spotlighting	No standard effort
	Non-predator scat collection	No standard effort

2.2.1 Standard methods used at systematic sites

At each standard 300 x 50 m systematic survey plot, the following standard methods were conducted;

Diurnal bird count

Two thirty minute diurnal bird counts were undertaken at each systematic site within the 200m x 50m plot, one early morning and one late morning count. The early morning count was conducted between dawn and two hours after dawn, and the late morning count was conducted between two and four hours after dawn. During each count, birds seen or heard while slowly traversing the 200 m transect were recorded as either on-site (if within 25m either side of the transect), as near-site (if recorded between 25 m and 200 m of the transect, flying overhead above the canopy) or off-site, if recorded > 200 m from the transect or in dissimilar vegetation. Covariates were recorded at the beginning of each count, including cloud cover, temperature, wind direction, wind velocity and precipitation.

Diurnal herpetofauna search

One person hour active diurnal search for herpetofauna was conducted at each systematic site within a 100 m x 50 m subplot located in the centre of the 200 m x 50 m transect. Active searching involved recording all individuals found active or sheltering underneath or within fallen woody debris, rocks, litter and decorticating bark. Individuals were caught for verification; those seen but not caught were either recorded to genus level, or not recorded. Representative voucher specimens were retained, preserved and taken to the Queensland Museum for verification.

Frogs heard calling within the subplot during the search were also recorded. During winter months searches were restricted to the warmer parts of the day; between 1100 and 1530 hours, and during summer months searches were not undertaken during the hottest parts of the day; between 1200 and 1400 hours. Covariates recorded at the beginning of each search included cloud cover, temperature, 24 hour maximum and minimum temperature, wind direction, wind velocity and precipitation.

Nocturnal herpetofauna search

One person hour active nocturnal search for herpetofauna was undertaken at each systematic site within two 50 m x 50 m subplots. The searches were usually conducted after the nocturnal call playback and before the spotlighting session. Active searches involved the use of Petzl Zoom headlamps, and recording all individuals found active on the ground or up trees, or underneath fallen debris, rocks, litter and decorticating bark. Frogs heard calling within each subplot were also recorded during this time. Covariates recorded before the commencement of each search included cloud cover, temperature, wind direction, wind velocity and precipitation.

Nocturnal bird call playback

One nocturnal bird call playback session was conducted at the centre point of each systematic survey site. One observer stayed at the centre point to play the calls, while a second observer moved to the 150 m point of the transect to listen for responses. Each call playback session involved an initial 10 minute listening period, where unelicited calls from arboreal mammals and nocturnal birds were recorded, followed by the broadcasting of pre-recorded calls of three large forest owls in the following sequence; powerful owl *Ninox strenua*, masked owl *Tyto novaehollandiae*, and sooty owl *Tyto tenebricosa*. At all wet sclerophyll and rainforest systematic sites, the marbled frogmouth *Podargus ocellatus plumiferus* call was played in addition to and preceding the owl calls. Each call was played for three minutes, followed by a two minute listening period. After the calls were played, each observer scanned by spotlight the immediate area for five minutes.

The distance from the transect to each call was recorded, and classified as either on-site (within the 200 m x 50 m plot) or off-site (outside of the 200 m x 50 m plot). Covariates recorded before the commencement of the call playback session included time after dusk, cloud cover, wind direction, wind velocity, precipitation, moon phase, and temperature.

Spotlighting for arboreal mammals

The spotlighting census involved two observers traversing the 300 m transect with 30 W/50 W spotlights for 0.5 hour (ie. one person hour). Distance to individuals seen or heard were recorded as on-site (if within the 300 m x 50 m transect) or off-site (if outside the 300 m x 50 m transect). Covariates recorded before the commencement of the spotlighting were the same as those recorded for the nocturnal bird call playback session.

Ultrasonic microbat call detection

Ultrasonic microbat call detection was used to sample high flying microchiropteran bats which are more difficult to capture using harp traps or mist nets. The ultrasonic detection was conducted at the centre point of each systematic site for 0.5 hours using ANABAT II, commencing at dusk. The covariates recorded at the completion of each ANABAT session included time after dusk, temperature, cloud cover, wind velocity, wind direction, precipitation and moon phase. Recorded calls were analysed by M. de Oliveira, Forest Wildlife, DNR and G. Ford, Forest Assessment Unit, DoE.

Elliott trapping for small mammals

At each systematic site 25 ‘A’ type Elliott traps were set eight metres apart along the 200 m transect. Traps were baited with peanut butter and oats mixture and left open for three nights. Traps were cleared early each morning, and trapped animals were sexed, aged and temporarily marked with either toluene free nail polish or fur clipped, so that recaptures could be identified.

Hair-tubes for small to medium-sized terrestrial mammals

Ten ground based hair-tubes (FAUNATECH) were set 20 m apart along the 200 m transect at each systematic site. The tubes were baited with peanut butter and oats mixture, and left on site for nine nights. All hair samples obtained were sent to B. Triggs ‘Dead Finish’ via Genoa, Victoria, for analysis. Samples were identified and classified into one of three reliability categories; definite, probable and possible. Only definite identifications were included in the analyses.

Predator scat search

Predator scats (dog *Canis familiaris*, fox *Vulpes vulpes* and quoll *Dasyurus* sp.) found within the 200 m x 50 m survey plot were either identified *in situ* and recorded or collected for identification through analysis of grooming hairs by B. Triggs. Remains of prey species were identified where possible, from hairs and bones in the scat. As with the identification of hair-tube samples, scat samples were classified as definite, probable or possible, depending upon the reliability of the identification. Only scat samples identified as definite were used in the analyses.

Harp trapping for microbats

Collapsible harp traps were used to capture low flying microchiropteran and small megachiropterans (such as the common blossom bat *Syconycteris australis* and the tube-nosed bat *Nyctimene robinsoni*) within each survey area. Where possible harp traps were set on systematic sites, but were more often set on opportunistic sites with suitable flyways. Harp traps were left open for two nights, and then moved to another location for a second session. Covariates recorded for each night a trap was open included trap placement, such as across roads or dry creek beds, and prevailing weather conditions such as maximum and minimum temperature, precipitation and moon phase.

Pitfall trapping

Pitfall traps were used to capture frog, reptile and small mammal species which are cryptic and difficult to detect, such as burrowing frogs and fossorial skinks. Pitfall traps were used at a subset of the systematic and opportunistic sites. One pitfall line was set per site, and consisted of five 10 litre buckets set five metres apart, connected by a 30 m fly wire drift fence. Pitfall lines were left open for three nights, and were checked early each morning for captures which were identified and released, unless collected as voucher specimens.

Incidental species records

Any species recorded within the systematic site (ie. within the 300 m x 50 m transect) during non-survey periods or during non-target surveys were recorded as incidental on-site. Any species detected incidentally between sites were recorded as off-site incidental records.

2.2.3 Non standard methods used within the survey area

Non standard survey methods are difficult to standardise with regard to effort and site selection, but are useful methods to detect certain cryptic species. Species detected using these survey methods were recorded as incidental. The non standard survey methods used during the CRA fauna surveys included;

Mistnetting

Mistnets were used as a non-standard method at suitable areas such as dams and ephemeral water holes within a survey area. Monofilament mistnets 14 m and 18 m in length were usually set over water bodies to capture microchiropteran bats flying in to drink. Unlike harp trapping, mistnetting to capture bats must be monitored at all times while the nets are opened. Mistnets were mostly used in conjunction with triplining, which also needs to be continually monitored.

Triplining

Triplining was used at dams and waterholes within survey areas to capture microchiropteran bats. This technique is useful to detect species with long, narrow wings such as *Mormopterus* sp. Triplining involves stringing, at high tension, fishing line of 6 or 8 lb breaking strength at regular intervals one to two centimetres above the surface of the dam or waterhole. Microchiropteran bats which fly in to drink are caught by the triplines and fall into the dam, which then swim to shore and are picked up at the shoreline for identification and release. Triplining requires constant monitoring, and is most effective at dusk.

Cave and roost searches
Within a survey area, any known or discovered caves were searched for cave-dwelling microchiropteran bat species. Similarly, bridges and culverts, which often provide shelter for roosting bats, in particular *Myotis* sp., were searched on an opportunistic basis.

Turtle trapping
Turtle traps were set at waterholes, dams and within permanent creeklines, in attempts to capture freshwater chelids. The traps consisted of collapsible "dillie pots", which are usually used to catch estuarine mud crabs. Traps were set on an opportunistic basis, baited with either bread, fish or meat, and left open for at least two nights. They were set in the deeper sections of a pond, adjacent to any available cover. The traps were usually suspended, with the upper part of the trap out of the water, so that captured animals could breathe, or were placed in shallow water where no securing point was available. Traps were checked early each morning for captures which were then identified and released.

Vehicle spotlighting
Vehicle based spotlighting tends to bias towards easily detected species with bright eyeshine such as greater gliders *Petauroides volans* and common brushtail possums *Trichosurus vulpecula*, and away from more cryptic species such as sugar gliders *Petaurus breviceps* and squirrel gliders *P. norfolcensis*. Roads also tend to follow ridgelines, which means that vehicle spotlighting biases surveys to ridge-based habitat types. Furthermore, data obtained from vehicle spotlighting is not readily analysed in site based systematic fauna surveys, and can be treated as incidental data only. This method was only used to obtain incidental records when driving between survey sites at night.

Non-predator scat collection
The distinctive scats of non-predator species such as koala *Phascolarctos cinereus* and rock-wallabies found during the surveys were identified or collected for verification.

2.3 EXTERNAL SYSTEMATIC FAUNA SURVEY DATASETS

Data from three systematic fauna survey projects contributed to the CRA systematic fauna survey project by assisting in the filling of geographical and seasonal gaps in the survey effort for priority species. These external datasets included the SEQ frog survey project, the Conondales plumed frogmouth survey and the yellow-bellied glider survey project.

2.3.1 SEQ frog survey project
Additional data on the distribution of frogs within the SEQ bioregion were obtained from a frog survey and monitoring project currently undertaken by Harry Hines, DoE, which began in March 1996. These data fall into two categories, systematic stream censuses and other records. Some of this data was provided by Brent Dadds, Clare Morrison and Michael Cunningham. All sites were accurately georeferenced using a GPS or 1:25 000 maps.

Systematic stream censuses
The survey targeted forested streams within the geographical and environmental range of the endangered frogs *Litoria pearsoniana, Taudactylus diurnus, T. pleione, Rheobatrachus silus, Mixophyes fleayi* and *M. iteratus.* These sites were selected opportunistically whilst investigating a monitoring program for these species.

Censuses were conducted during summer months, when the warmer and more humid weather conditions are most suitable for the breeding of stream-dependent frogs. At least 100 m of stream was searched at night for active or calling frogs by walking slowly along the stream bed listening and scanning with the aid of headtorches. Covariates recorded at each census included survey effort, wet and dry bulb temperature, cloud cover, wind strength, moon phase, night light and

precipitation.

Other records

In addition to stream censuses the SEQ Frog Survey conducted censuses at ponds and ephemeral wetlands and gathered incidental records of frogs from roads and walking tracks etc. Data on the presence of frog species was collated from all these sources, including records from multiple censuses at sites.

2.3.2 Conondale Range plumed frogmouth survey

Additional plumed frogmouth call playback surveys throughout the Conondale Ranges were provided by Geoff Smith, DNR. These surveys consisted of plumed frogmouth call playback censuses conducted between 1994 and 1996, using a similar methodology used by the CRA fauna surveys to detect plumed frogmouths. Each call playback site was georeferenced using a GPS.

2.3.3 Yellow-bellied glider survey

The yellow-bellied glider survey project, conducted by Teresa Eyre, DNR, provided additional data on the distribution of arboreal marsupials throughout the SEQ bioregion. These surveys were conducted between 1993 and 1996 and were accurately georeferenced. The methods used to collect data during the yellow-bellied glider survey were similar to those used by the CRA systematic fauna survey project for the detection of arboreal marsupials. Sites were selected using a stratified survey design based on geology, rainfall and forest cover. The sampling unit used was a 1 person hour spotlighting transect of 200 m length, using 30 W and 50 W spotlights. Distance to an individual either seen or heard was recorded as on-site (if within the 200 m x 50 m transect) or off-site (if outside the 200 m x 50 m transect). Covariates recorded before the commencement of the spotlighting session included time after dusk, cloud cover, wind direction, wind velocity, precipitation, moon phase, and temperature.

3. RESULTS

3.1 DISTRIBUTION OF SITES BY SURVEY METHOD

During the CRA surveys, most survey effort was conducted at the 267 systematic sites, although one or more standard survey methods were conducted at a number of opportunistic sites within each survey area. Table 3.1 provides a summary of the number of sites where a particular survey method was conducted, either at systematic or opportunistic sites.

TABLE 3.1 SUMMARY OF SURVEY METHODS CONDUCTED DURING THE CRA FAUNA SURVEYS

Survey Methods	No. of survey areas	No. systematic sites	No. opportunistic sites
Diurnal bird count	36	265	-
Diurnal herpetofauna search	36	267	53
Nocturnal herpetofauna search	34	243	9
Nocturnal bird call playback	36	267	77
Spotlighting	36	267	6
Elliott trapping	34	250	14
Hair tubes	34	229	1
Scat search	36	267	11
Ultrasonic microbat call detection	36	258	36
Harp trapping	36	66	192
Pitfall trapping	33	87	18
Triplining	12	1	14
Mistnetting	7	1	8
Turtle trapping	6	3	7
Vehicle spotlight	1	-	1
Incidental Records	36	260	200

3.1.1 Distribution of standard survey sites

Diurnal bird count sites

Early and late morning diurnal bird counts were conducted at 265 sites, all of which were systematic, across all survey areas. No diurnal bird counts were undertaken at opportunistic sites. Figure 3.1.1 shows the location of all diurnal bird count sites throughout the SEQ bioregion and Blackdown Tableland area.

Diurnal herpetofauna search sites

Standard herpetofauna searches were conducted at a total number of 320 sites, 267 of which were at systematic sites, the remainder being opportunistic sites. Searches were conducted across the 36 survey areas, as shown in Figure 3.1.2.

Nocturnal herpetofauna search sites

Standard nocturnal herpetofauna searches were undertaken across 34 survey areas, at a total number

of 252 sites. This method was not used during the first two CRA surveys at Wrattens SF and Oakview SF. Most of the searches were conducted at systematic sites (243 in all), with only nine searches at opportunistic sites. Figure 3.1.3 shows the distribution of all nocturnal herpetofauna search sites.

Nocturnal bird call playback

Standard nocturnal call playback was conducted within all survey areas, at 267 systematic survey sites, and at an additional 77 opportunistic sites. The opportunistic sites extended the range of nocturnal bird call playback survey effort during the CRA surveys (Figure 3.1.4).

Spotlighting

Standard spotlighting sessions were undertaken at all 267 systematic survey sites across the 36 survey areas, and at an additional 6 opportunistic sites. Figure 3.1.5 shows the distribution of all standard spotlighting surveys which were conducted during the CRA surveys.

Elliott trapping

Elliott trap lines were set at 250 systematic sites and a further 14 opportunistic sites across 34 survey areas. Elliott traps as a standard survey technique was not used during the first two CRA surveys at Wrattens SF and Oakview SF (Figure 3.1.6).

Hair-tube trapping

Standard hair-tube lines were set at 229 systematic sites and only one opportunistic site across 34 survey areas. Numinbah SF and Glenbar SF were the only survey areas where this technique was not used (Figure 3.1.7).

Predator scat searches

Predator scat searches were conducted across the 36 survey areas at all 267 sites. A further 11 opportunistic sites were also searched for scats. Figure 3.1.8 displays the distribution of systematic and opportunistic sites where searches for predator scats were undertaken.

Ultrasonic microbat call detection

Standard ultrasonic microbat call ANABAT II detection was used at all 36 survey areas at 258 systematic sites and at an additional 36 opportunistic sites (Figure 3.1.9).

Harp trapping

Standard harp trapping sessions were undertaken across all 36 survey areas. Most harp traps were set at opportunistic sites (192 sites), than at systematic sites (66 sites), reflecting the requirement of this survey technique to place traps in suitable flyways, which were not always present at systematic sites. Generally six to 12 standard harp trapping sessions were conducted at each survey area. Figure 3.1.10 illustrates the distribution of harp trapping sites across the SEQ bioregion and Blackdown Tableland.

Pitfall trapping

Pitfall lines were set at 33 survey areas, on 87 systematic sites and at an additional 18 opportunistic sites. Generally two to four pitfall lines were set at each survey area. Pitfall trapping was not used at 3 survey areas, including the first two surveys at Wrattens SF and Oakview SF, and Goomburra SF (Figure 3.1.11).

FIGURE 3.1.1 DISTRIBUTION OF CRA STANDARD DIURNAL BIRD COUNT SITES

FIGURE 3.1.2 DISTRIBUTION OF CRA STANDARD DIURNAL HERPETOFAUNA SEARCH SITES

FIGURE 3.1.3 DISTRIBUTION OF CRA STANDARD NOCTURNAL HERPETOFAUNA SEARCH SITES

FIGURE 3.1.4 DISTRIBUTION OF CRA STANDARD NOCTURNAL BIRD CALL PLAYBACK SITES

FIGURE 3.1.5 DISTRIBUTION OF CRA STANDARD SPOTLIGHTING SITES

FIGURE 3.1.6 DISTRIBUTION OF CRA STANDARD ELLIOTT TRAPPING SITES

FIGURE 3.1.7 DISTRIBUTION OF CRA STANDARD HAIR-TUBE TRAPPING SITES

FIGURE 3.1.8 DISTRIBUTION OF CRA STANDARD SCAT SEARCH SITES

FIGURE 3.1.9 DISTRIBUTION OF CRA STANDARD ULTRASONIC CALL DETECTION SITES

FIGURE 3.1.10 DISTRIBUTION OF CRA STANDARD HARP-TRAPPING SITES

FIGURE 3.1.11 DISTRIBUTION OF CRA STANDARD PITFALL TRAPPING SITES

3.1.2 Distribution of non-standard survey sites

Figure 3.1.12 shows the distribution of sites where non-standard survey techniques were used to detect vertebrate species. Of the non-standard survey methods, turtle trapping was used at nine sites across six survey areas, triplining was used at 16 sites across 12 survey areas, and mistnetting was used at three sites across three survey areas.

3.1.3 Distribution of external dataset survey sites

SEQ frog survey

Systematic frog surveys (data provided by H. Hines, DoE) were conducted at 78 sites which largely complemented the CRA systematic fauna survey sites throughout the SEQ bioregion (Figure 3.1.13). SEQ frog surveys were conducted at 10 additional survey areas to the CRA surveys, including Bunya Mountains NP, Lamington NP, Mt Cougal section of Springbrook NP, Tamborine NP, Eudlo Creek NP, Maiala NP (in Brisbane Forest Park), Main Range NP, and state forests 311, 298 and 611.

Conondales plumed frogmouth survey

The Conondales plumed frogmouth survey (data provided by G. Smith, DNR) was conducted at 15 sites which, though restricted largely to the Conondale Range area, were spread across two CRA survey areas and one area which was not surveyed by the CRA systematic fauna survey project (Figure 3.1.14).

Yellow-bellied glider survey

Th yellow-bellied glider survey (data provided by T. Eyre, DNR) provided a further 60 systematic arboreal marsupial systematic sites to complement the CRA survey sites. Yellow-bellied glider surveys were conducted at 10 survey areas additional to the 36 CRA survey areas, including St Marys SF, Bauple SF, Daisy Hill NP, Noosa Head NP, Mt Barney NP, SF 210, Gootchie SF 940, Mt Stanley SF 673, Kenilworth SF 467, Beerwah SF 561 (Figure 3.1.15).

FIGURE 3.1.12 DISTRIBUTION OF CRA NON-STANDARD METHODS

FIGURE 3.1.13 DISTRIBUTION OF SEQ FROG SURVEY SITES

FIGURE 3.1.14 DISTRIBUTION OF CONONDALE PLUMED FROGMOUTH SURVEY SITES

FIGURE 3.1.15 DISTRIBUTION OF YELLOW-BELLIED GLIDER SURVEY SITES

3.2 SURVEY RESULTS

This chapter provides a summary of the results obtained during the CRA systematic fauna surveys for each vertebrate functional group.

3.2.1 Frogs

Thirty-two species of amphibians were recorded during the CRA surveys, using six standard survey methods. These included diurnal and nocturnal herpetofauna searches, pitfall traps, Elliott traps, call playback and spotlight methods. Table 3.2.1 lists the species and the relative frequency with which the species was detected for each of the methods used. An additional four species were recorded as incidental records only. The nocturnal herpetofauna search method was the most successful technique used, detecting 30 species altogether. Diurnal herpetofauna search and spotlighting methods detected similar numbers of species accounting for 23 and 20 species respectively. Pitfall trapping detected 11 species, of these, all but one species, *Litoria caerulea*, were ground dwelling species.

The most commonly recorded species during the CRA surveys were *Pseudophryne raveni* and *Pseudophryne major;* both were detected most frequently by nocturnal herpetofauna searches. The least frequently recorded species were *Litoria dentata, L. brevipalmata, Assa darlingtoni, Kyarranus kundagungun* and *Mixophyes fleayi.* Three of these species, *L. brevipalmata, A. darlingtoni* and *K. kundagungun* are listed as rare while *M. fleayi* is listed as endangered under the Nature Conservation Act. Factors such as seasonality may have influenced the detectability of this group of fauna during the CRA surveys.

3.2.2 Small reptiles

During the CRA fauna surveys 57 species of small and medium sized reptiles were recorded using six standard survey methods including diurnal and nocturnal herpetofauna searches, pitfall traps, Elliott traps, hair-tubes and spotlighting. An additional five species were recorded as incidental records only. Table 3.2.2 lists the species and the relative frequency with which the species were recorded for each of the methods during the survey. Diurnal herpetofauna searches recorded the most species, detecting 54 species. Nocturnal herpetofauna searches and pitfall trapping were the second most successful methods, detecting 32 and 28 species respectively. Elliott traps, hair-tubes and spotlighting were the least successful methods, detecting five, two and four species respectively. However, Elliott trapping was the only method responsible for recording *Egernia frerei.* Both the diurnal and nocturnal herpetofauna search methods recorded nine out of the total of ten recorded geckos. All species apart from two were recorded using either diurnal or nocturnal herpetofauna searches; these were *E. frerei* and *Ophioscincus cooloolensis.* The latter species was recorded by pitfall trapping only.

The two most commonly recorded species during the CRA surveys were *Cryptoblepharus virgatus* and *Carlia pectoralis,* which were both detected most frequently by diurnal herpetofauna searches. The least frequently recorded species were *Delma tincta, D. torquata, Paradelma orientalis, E. frerei, E. cunninghami, E. striolata, Eulamprus murrayi, Nangura spinosa, Ophioscincus cooloolensis, Saproscincus rosei, Ramphotyphlops silvia* and *R. weidii*. Of these, the following four species were listed as rare: *Nangura spinosa, Ophioscincus cooloolensis, Saproscincus rosei* and *R. silvia.* One species, *D. torquata* is listed as vulnerable under the Nature Conservation Act.

TABLE 3.2.1 RESULTS SUMMARY OF CRA SURVEYS TO DETECT FROGS

Methods	Diurnal herptofauna search		Nocturnal herptofauna search		Pitfalls traps		Elliotts traps		Call playback		Spotlight	
Number of sites	*320*		*252*		*105*		*264*		*344*		*273*	
Species	Sites	%freq	Sites	%freq	Sites	%freq	Sites	%freq	Sites	%freq	Sites	%freq
Adelotus brevis	4	1.2	13	5.2	2	0.6			2	0.6	1	0.4
Assa darlingtoni	1	0.3	1	0.4								
Crinia parinsignifera	2	0.6	8	3.2								
Crinia signifera	6	1.9	5	1.9	2	1.9			2	0.6	1	0.4
Crinia tinnula			2	0.8								
*Cyclorana alboguttata**												
Kyarranus kundagungan	1	0.3	1	0.4							1	0.4
*Lechriodus fletcheri**												
Limnodynastes dumerilii	1	0.3	3	1.2							1	0.4
Limnodynastes ornatus	2	0.6	3	1.2	8	7.6					3	1.1
Limnodynastes tasmaniensis									1	0.3	2	0.7
Limnodynastes terraereginae	3	0.9	8	3.2	7	6.7	1	0.4	1	0.3		
Mixophyes fasciolatus	1	0.3	13	5.2	4	3.8			4	1.2	6	2.2
Mixophyes fleayi			1	0.4							1	0.4
Pseudophryne coriacea	1	0.3	1	0.4							2	0.7
Pseudophryne major	3	0.9	13	5.2	3	2.8			5	1.4	6	2.2
Pseudophryne raveni	6	1.9	15	5.9	3	2.8			3	0.9	6	2.2
Uperoleia fusca	2	0.6			3	2.8						
Uperoleia laevigata			4	1.6	2	1.9						
Litoria brevipalmata			1	0.4	1	0.9						
Litoria caerulea	2	0.6	5	1.9	1	0.9					2	0.7
Litoria chloris			3	1.2					1	0.3	1	0.4
Litoria dentata			1	0.4								
Litoria fallax	8	2.5	8	3.2					2	0.6	2	0.7
Litoria freycineti			2	0.8								
Litoria gracilenta	2	0.6	10	3.9					7	2.0	4	1.5
*Litoria inermis**												
Litoria latopalmata	2	0.6	11	4.4					1	0.3	3	1.1
Litoria lesueuri	9	2.8	12	4.8								
Litoria nasuta	3	0.9	2	0.8								
Litoria olongburensis			3	1.2								
Litoria pearsoniana	1	0.3	4	1.6							2	0.7
Litoria peronii	1	0.3	4	1.6					2	0.6	1	0.4
*Litoria rothii**												
Litoria rubella	6	1.9	8	3.2					2	0.6	1	0.4
Litoria tyleri			1	0.4								
Litoria verreauxii	3	0.9							1	0.3	2	0.7
Litoria. sp. cf. barringtonensis			3	1.2							2	0.7

TABLE 3.2.2 RESULTS SUMMARY OF CRA SURVEYS TO DETECT SMALL REPTILES

Methods	Diurnal herp search		Nocturnal herp search		Pitfalls traps		Elliotts traps		Hair-tubes		Spotlight	
Number of sites	*320*		*252*		*105*		*264*		*230*		*273*	
Species	Sites	%freq	Sites	%freq	Sites	%freq	Sites	%freq	Sites	%freq	Sites	%freq
Diplodactylus vittatus	5	1.6	14	5.6	4	3.8					1	0.4
Gehyra dubia	17	5.3	14	5.6							1	0.4
Heteronotia binoei	36	11.3	23	9.1	2	1.90						
Nephrurus asper			1	0.4								
Nephrurus milii	3	0.9	3	1.2								
Oedura rhombifer	17	5.3	11	4.4								
Oedura robusta	4	1.3	4	1.6							1	0.4
Oedura tryoni	31	9.7	26	10.3	1	1.0					2	0.7
Phyllurus caudiannulatus	1	0.3										
Saltuarius salebrosus	2	0.6	5	2.0								
Delma plebeia *												
Delma tincta	1	0.3										
Delma torquata	2	0.6			1	1.0						
Lialis burtonis	2	0.6			1	1.0						
Paradelma orientalis	1	0.3										
Pygopus lepidopodus *												
Amphibolurus nobbi	13	4.1			2	1.9						
Diporiphora australis	8	2.5			1	1.0						
Anomalopus leuckartii	4	1.3										
Anomalopus verreauxi	22	6.9	3	1.2	2	1.0						
Calyptotis lepidorostrum	9	2.8	3	1.2	2	1.0						
Calyptotis scutirostrum	32	10.0	9	3.6	5	4.8						
Calyptotis temporalis	4	1.3	1	0.4								
Carlia munda *												
Carlia pectoralis	83	25.9	6	2.4	15	14.3	1	0.4	1	0.4		
Carlia schmeltzii	7	2.2	1	0.4	1	1.0						
Carlia vivax	23	7.2			5	4.8						
Coeranoscincus reticulatus	3	0.9										
Cryptoblepharus virgatus	95	29.7	18	7.1	5	4.8						
Ctenotus arcanus	15	4.7	3	1.2	2	1.0	1	0.4				
Ctenotus robustus	3	0.9										
Ctenotus taeniolatus	29	9.1	5	2.0	4	3.8						
Cyclodomorphus gerrardii	1	0.3	2	0.8							1	0.4
Egernia cunninghami	1	0.3					1	0.4				
Egernia frerei							1	0.4				
Egernia major *												
Egernia striolata	1	0.3										
Eroticoscincus graciloides	6	1.9	2	0.8	1	1.0						

* denotes species recorded as incidental only

Table 3.2.2 continued next page

Table 3.2.2 RESULTS SUMMARY OF CRA SURVEYS TO DETECT SMALL REPTILES (CONTINUED)

Methods	Diurnal herp search		Nocturnal herp search		Pitfalls traps		Elliotts traps		Hair-tubes		Spotlight	
Number of sites	*320*		*252*		*105*		*264*		*230*		*273*	
Species	Sites	%freq	Sites	%freq	Sites	%freq	Sites	%freq	Sites	%freq	Sites	%freq
Eulamprus brachysoma	1	0.3			2	1.9						
Eulamprus martini	30	9.4	8	3.2	1	1.0						
Eulamprus murrayi	1	0.3					1	0.4				
Eulamprus quoyii	6	1.9	1	0.4								
Eulamprus sokosoma	4	1.3										
Eulamprus tenuis	13	4.1	2	0.8	1	1.0						
Glaphyromorphus punctulatus	4	1.3	1	0.4								
Lampropholis adonis	17	5.3	3	1.2								
Lampropholis amicula	25	7.8	1	0.4	14	13.3			1	0.4		
Lampropholis couperi	2	0.6										
Lampropholis delicata	37	11.5	1	0.4	13	12.4						
Lampropholis guichenoti	1	0.3			2	1.9						
Lerista fragilis	24	7.5	5	2.0	2	1.9						
Lygisaurus foliorum	69	21.5	12	4.7	15	14.3						
Lygisaurus timlowi	2	0.6			1	1.0						
Morethia taeniopleura	22	6.9	2	0.8	6	5.7						
Nangura spinosa	1	0.3										
Ophioscincus cooloolensis					2	1.9						
Ophioscincus ophioscincus	6	1.9	2	0.8								
Saiphos equalis	2	0.6			1	0.9						
Saproscincus challengeri *												
Saproscincus rosei	1	0.3										
Ramphotyphlops nigrescens	2	0.6	1	0.4								
Ramphotyphlops silvia	2	0.6										
Rhamphotyphlops weidii	3	0.9	1	0.4								

* denotes species recorded as incidental only

3.2.3 Large Reptiles

During the CRA surveys 24 species of large reptiles were recorded using seven standard survey methods including diurnal and nocturnal herpetofauna searches, pitfall traps, Elliott traps, hair-tubes, call playback and spotlighting. An additional six species were recorded as incidental records only. Table 3.2.3 lists the species and the relative frequency with which the species was detected for each standard survey method. Diurnal herpetofauna search methods provided the most species records, detecting 24 species. Nocturnal herpetofauna searches accounted for 11 species, of these, three were additional to those recorded by diurnal herpetofauna searches. One species, *Cacophis harriettae*, was recorded by pitfall trapping only.

The most commonly recorded species during the CRA survey was *Rhinoplocephalus nigrescens*, which was detected most frequently by diurnal herpetofauna search methods. Sixty-six percent of the total number of species recorded by standard methods were detected from less than three sites during the CRA surveys.

TABLE 3.2.3 RESULTS SUMMARY OF CRA SURVEYS TO DETECT LARGE REPTILES

Methods	Diurnal herp search		Nocturnal herp search		Pitfalls traps		Elliotts traps		Hairtubes		Spotlight	
Number of sites	*320*		*252*		*105*		*264*		*230*		*273*	
Species	Sites	%freq	Sites	%freq	Sites	%freq	Sites	%freq	Sites	%freq	Sites	%freq
Elseya latisternum	1	0.3										
*Chlamydosaurus kingii**												
*Hypsilurus spinipes**												
Physignathus lesueurii	5	1.5	1	0.4								
Pogona barbata			1	0.4								
Varanus gouldii	1	0.3										
Varanus tristis	2	0.6	1	0.4	1	0.9	1	0.4				
Varanus varius	7	2.2	1	0.4								
*Aspidites melanocephalus**												
Liasis maculosus			1	0.4								
Morelia spilota	2	0.6	2	0.8							1	0.4
Boiga irregularis	1	0.3									2	0.7
Dendrelaphis punctulata	1	0.3	1	0.4								
*Tropidonophis mairii**												
Acanthophis antarcticus	1	0.3										
Cacophis harriettae					1	0.9						
Cacophis krefftii	1	0.3										
Cacophis squamulosus	2	0.6										
Demansia atra	2	0.6										
Demansia psammophis	9	2.8	1	0.4								
Furina diadema	5	1.5										
Hemiaspis signata	1	0.3	1	0.4								
*Hoplocephalus stephensii**												
Pseudechis porphyriacus	2	0.6										
Pseudonaja textilis	1	0.3									1	0.4
*Rhinoplocephalus boschmai**												
Rhinoplocephalus nigrescens	22	6.9	10	3.9	1	0.9			1	0.4	1	0.4
Simoselaps australis	3	0.9										
Tropidechis carinatus	2	0.6										
Vermicella annulata			1	0.4	1	0.9						

* denotes species recorded as incidental only

3.2.4 Diurnal birds

Table 3.2.4 lists all species recorded with the number of censuses where detected, and the relative frequency for that method. Three tallies are given according to the distance of the birds from the transect: those within the 200 x 50 m site; those within 200 m of the transect; and those outside 200m from the site or in dissimilar habitat. The 528 standard diurnal bird counts (early and late combined) recorded 13,934 observations of 164 species. Of these, 147 species were detected on-site (ie. within the 200 x 50 m transect area), the remainder were only recorded as near-site (ie. within 200 m x 400 m transect area). The records of birds off-site (over 200 m from the transect)

provided no additional species. The 17 species that were not detected on-site but were detected near-site included six records of five species of raptor. A number of vocal species that were less common, wide ranging or visually cryptic were also better surveyed within the wider (200 x 400 m) area; notably the cuckoos, cockatoos and pigeons. An additional 16 species were only recorded incidentally on-site, although many of these are largely wide ranging or vagrant in the habitats surveyed. A further 32 species were recorded incidentally within the survey areas. These were mostly water birds or birds of open country.

The grey fantail *Rhiphidura fuliginosa* was by far the most frequently detected species during diurnal bird counts, occurring on 84% of counts. The Lewin's honeyeater *Meliphaga lewinii* and spotted pardalote *Pardalotus punctatus* were recorded on over 66% of the counts. The white-throated treecreeper *Cormobates leucophaeus,* brown thornbill *Acanthiza pusilla,* yellow-faced honeyeater *Lichenostomus chrysops,* golden whistler *Pachycephala pectoralis*, white-browed scrubwren *Sericornis frontalis* grey shrike-thrush *Colluricincla harmonica*, and scarlet honeyeater *Myzomela sanguinolenta* were recorded in over half the censuses. All ten species are both widespread and abundant, but in being also vocal and predominantly arboreal they are likely to have been recorded on both early and late transects where present.

TABLE 3.2.4 RESULTS SUMMARY OF CRA SURVEYS TO DETECT DIURNAL BIRDS

Methods	Diurnal bird counts 200x50		Diurnal bird counts 200x400		Diurnal bird counts off-site	
Number of censuses	*528*		*528*		*528*	
Species	Censuses	%freq	Censuses	%freq	Censuses	%freq
Australian brush-turkey	7	0.6	10	1.9		
brown quail	1	0.2	2	0.4		
king quail			1	0.2		
Australian wood duck			1	0.2	1	0.2
Pacific black duck			1	0.2		
great cormorant			1	0.2		
white-faced heron	1	0.2				
nankeen night heron	1	0.2	1	0.2		
Pacific baza	2	0.4	3	0.6		
black-shouldered kite			1	0.2		
square-tailed kite	1	0.2	2	0.4		
whistling kite			1	0.2		
brown goshawk	2	0.4	3	0.6		
grey goshawk	3	0.6	4	0.8	1	0.2
collared sparrowhawk	3	0.6	3	0.6		
wedge-tailed eagle	1	0.2	4	0.8		
brown falcon			2	0.4		
peregrine falcon			1	0.2		
nankeen kestrel			1	0.2		
painted button-quail	7	1.3	9	1.7		
black-breasted button-quail	4	0.8	5	0.9		
masked lapwing			1	0.2		
white-headed pigeon	1	0.2	6	1.1	1	0.2
brown cuckoo-dove	21	4.0	67	12.7	5	0.9
emerald dove	4	0.8	6	1.1		
common bronzewing	2	0.4	6	1.1		
crested pigeon	1	0.2	6	1.1		
peaceful dove			20	3.8	1	0.2
bar-shouldered dove	8	1.5	56	10.6	4	0.8
wonga pigeon	11	2.1	59	11.2	14	2.6
wompoo fruit-dove	8	1.5	13	2.5	5	0.9
rose-crowned fruit-dove	3	0.6	5	0.9		
topknot pigeon	5	0.9	7	1.3	1	0.2
red-tailed black-cockatoo	3	0.6	6	1.1	1	0.2
glossy black-cockatoo	5	0.9	17	3.2	1	0.2
yellow-tailed black-cockatoo	1	0.2	27	5.1	5	0.9
galah	2	0.4	9	1.7	1	0.2
sulphur-crested cockatoo	9	1.7	68	12.9	13	2.5
cockatiel			1	0.2		
rainbow lorikeet	114	21.6	266	50.4	4	0.8
scaly-breasted lorikeet	59	11.2	131	24.8	2	0.4
musk lorikeet	4	0.8	7	1.3		
little lorikeet	54	10.2	123	23.3	1	0.2
Coxen's fig parrot						
Australian king parrot	44	8.3	99	18.7	3	0.6
red-winged parrot	1	0.2	2	0.4	2	0.4
crimson rosella	24	4.5	42	7.9		
eastern rosella						
pale-headed rosella	33	6.2	67	12.7	1	0.2
oriental cuckoo	1	0.2	1	0.2		
pallid cuckoo	1	0.2	1	0.2	1	0.2
brush cuckoo	1	0.2	8	1.5	3	0.6
fan-tailed cuckoo	23	4.4	113	21.4	6	1.1
black-eared cuckoo	1	0.2	1	0.2		
Horsfield's bronze-cuckoo	1	0.2	5	0.9		
shining bronze-cuckoo	26	4.9	122	23.1	9	1.7
little bronze-cuckoo	1	0.2	2	0.4		

Methods	Diurnal bird counts 200x50	Diurnal bird counts 200x400	Diurnal bird counts off-site

Number of sites	*528*		*528*		*528*	
Species	Sites	%freq	Sites	%freq	Sites	%freq
common koel	4	0.8	13	2.5	2	0.4
channel-billed cuckoo			9	1.7	5	0.9
pheasant coucal	2	0.4	25	4.7	16	3.0
white-rumped swiftlet						
white-throated needletail	6	1.1	10	1.9		
azure kingfisher	4	0.8				
laughing kookaburra	36	6.8	152	28.8	22	4.2
forest kingfisher	3	0.6	21	4.0		
sacred kingfisher	6	1.1	21	4.0	1	0.2
rainbow bee-eater	26	4.9	107	20.3		
dollarbird	3	0.6	10	1.9		
noisy pitta	9	1.7	24	4.5	1	0.2
Albert's lyrebird			7	1.3	4	0.8
white-throated treecreeper	168	31.8	451	85.4	7	1.3
red-browed treecreeper	2	0.4	5	0.9		
brown treecreeper	2	0.4	23	4.4		
superb fairy-wren	8	1.5	8	1.5		
variegated fairy-wren	38	7.2	51	9.7		
red-backed fairy-wren	32	6.1	44	8.3		
spotted pardalote	186	35.2	411	77.8	4	0.8
striated pardalote	71	13.4	168	31.8		
yellow-throated scrubwren	26	4.9	32	6.1		
white-browed scrubwren	136	25.8	177	33.5	1	0.2
large-billed scrubwren	83	15.7	102	19.3		
speckled warbler	11	2.1	14	2.6		
weebill	23	4.4	50	9.5		
brown gerygone	87	16.5	134	25.4		
large-billed gerygone	3	0.6	3	0.6		
fairy gerygone	1	0.2	2	0.9		
white-throated gerygone	26	4.9	99	18.7	4	0.8
brown thornbill	154	29.2	199	37.7		
buff-rumped thornbill	55	10.4	80	15.1		
yellow thornbill	6	1.1	7	1.3		
striated thornbill	40	7.6	53	10.0		
red wattlebird	6	1.1	9	1.70		
little wattlebird	10	1.9	22	4.2	1	0.2
striped honeyeater	1	0.2	3	0.6		
noisy friarbird	122	23.1	302	57.2	3	0.6
little friarbird	17	3.2	45	8.5	1	0.2
blue-faced honeyeater	21	4.0	51	9.7		
bell miner	8	1.5	22	4.2	1	0.2
noisy miner	73	13.8	177	33.5	7	1.3
Lewin's honeyeater	191	36.2	397	75.2	18	3.4
yellow-faced honeyeater	153	29.0	307	58.1	2	0.4
white-eared honeyeater	6	1.1	10	1.9		
yellow-tufted honeyeater	14	2.6	26	4.9		
fuscous honeyeater	34	6.4	59	11.2		
black-chinned honeyeater	6	1.1	16	3.0	1	0.2
brown-headed honeyeater	3	0.6	5	0.9		
white-throated honeyeater	102	19.3	195	36.9	1	0.2
white-naped honeyeater	97	18.4	134	25.4		
brown honeyeater	31	5.9	64	12.1		
New Holland honeyeater	1	0.2	1	0.2		
white-cheeked honeyeater	7	1.3	9	1.7		
eastern spinebill	37	7.0	64	12.1		
dusky honeyeater	4	0.8	5	0.9		
scarlet honeyeater	134	25.4	263	49.8	1	0.2
jacky winter	9	1.7	50	9.5	1	0.2

Methods	Diurnal bird counts 200x50	Diurnal bird counts 200x400	Diurnal bird counts off-site
Number of sites	*528*	*528*	*528*

Species	Sites	%freq	Sites	%freq	Sites	%freq
rose robin	30	5.7	46	8.7		
pale-yellow robin	9	1.7	9	1.7		
eastern yellow robin	131	24.8	225	42.6	1	0.2
logrunner	13	2.4	18	3.4		
grey-crowned babbler	5	0.9	17	3.2	7	1.3
eastern whipbird	67	12.7	211	39.9	31	5.9
spotted quail-thrush	5	0.9	6	1.1		
varied sittella	18	3.4	29	5.5		
crested shrike-tit	5	0.9	11	2.1		
golden whistler	147	27.8	275	52.1	2	0.4
rufous whistler	119	22.5	276	52.3	3	0.6
little shrike-thrush	23	4.4	34	6.4	1	0.2
grey shrike-thrush	135	25.6	414	78.4	5	0.9
black-faced monarch	18	3.4	38	7.2		
spectacled monarch	9	1.7	15	2.8		
white-eared monarch	5	0.9	7	1.3		
leaden flycatcher	50	9.5	107	20.3		
restless flycatcher	7	1.3	15	2.8		
magpie lark	4	0.7	16	3.0	1	0.2
rufous fantail	41	7.8	55	10.4	2	0.4
grey fantail	223	42.2	372	70.4		
willie wagtail	13	2.5	42	7.9		
spangled drongo	17	3.2	39	7.4		
black-faced cuckoo-shrike	29	5.5	80	15.1		
barred cuckoo-shrike	3	0.6	3	0.6		
white-bellied cuckoo-shrike	15	2.8	48	9.1		
cicadabird	20	3.7	72	13.6	1	0.2
white-winged triller			1	0.2		
varied triller	31	5.8	53	10.0	1	0.2
olive-backed oriole	51	9.7	73	13.	3	0.6
figbird	21	3.9	40	7.6	2	0.4
white-breasted woodswallow			2	0.4		
white-browed woodswallow			2	0.4		
dusky woodswallow	4	0.7	19	3.6		
grey butcherbird	30	5.7	148	28.0	18	3.4
pied butcherbird	10	1.9	52	9.8	12	2.3
Australian magpie	17	3.2	125	23.7	36	6.8
pied currawong	46	8.7	247	46.8	36	6.8
paradise riflebird	14	2.6	24	4.5	1	0.2
Australian raven	1	0.2	2	0.4		
Torresian crow	38	7.2	211	39.9	46	8.7
white-winged chough	1	0.2	5	0.9	1	0.2
apostlebird						
green catbird	11	2.1	31	5.9		
regent bowerbird	8	1.5	9	1.7	1	0.2
satin bowerbird	15	2.8	39	7.3		
Richard's pipit						
double-barred finch	3	0.6	5	0.9		
red-browed finch	51	9.6	62	11.7	1	0.2
mistletoebird	87	16.5	133	25.1		
welcome swallow	2	0.4	2	0.4		
tree martin	4	0.7	7	1.3		
tawny grassbird			1	0.2		
silvereye	113	21.4	205	38.8		
russet-tailed thrush	5	0.9	12	2.3		
Total records	4537		10157.00		402.00	

3.2.5 Nocturnal birds

The CRA fauna surveys recorded ten of the eleven nocturnal birds known from the bioregion, missing only the spotted nightjar *Caprimulgus guttatus*. Table 3.2.5 gives the frequencies and relative frequencies of records for each method for each species. Most records are from playback sessions and spotlight searches with the small remainder occurring in a range of other methods. Powerful owls *Ninox strenua*, sooty owls *Tyto tenebricosa* and plumed frogmouths *Podargus ocellatus plumiferus* were mostly detected during call playback sessions. Some spotlighting records

may have been birds responding to prior call playback sessions. Only the tawny frogmouth *Podargus strigoides* was recorded more often in the spotlight sessions. The relatively few masked owl *Tyto novaehollandiae* records differ little in frequency between spotlight, call playback sessions and incidental records. Barking owls *Ninox connivens* and barn owls *Tyto alba* were the least often recorded.

The most common nocturnal birds recorded, the owlet nightjar *Aegotheles cristatus* and southern boobook *Ninox novaeseelandiae*, were recorded in similar relative frequencies in spotlighting and call playback sessions.

TABLE 3.2.5 RESULTS SUMMARY OF CRA SURVEYS TO DETECT NOCTURNAL BIRDS

Methods	Spotlight		Nocturnal bird call playback		Diurnal bird count (early)		Diurnal bird count (late)		Diurnal herp search		Nocturnal herp search	
Number of sites	*273*		*344*		*265*		*265*		*320*		*252*	
Species	Sites	%freq	Sites	%freq	Sites	%freq	Sites	%freq	Sites	%freq	Sites	%freq
powerful owl	3	1.1	14	4.1								
barking owl	2	0.7	1	0.3	1	0.4			1	0.3		
southern boobook	43	15.8	69	20.1					1	0.3	1	0.4
sooty owl			13	3.8								
masked owl	5	1.8	8	2.3								
barn owl			1	0.3								
tawny frogmouth	19	7.0	6	1.7	2	0.8					1	0.4
plumed frogmouth	6	2.2	31	9.0								
white-throated nightjar	19	7.0	17	4.9							1	0.4
Australian owlet-nightjar	74	27.1	103	29.9	1	0.4	3	1.1	1	0.3	4	1.6

3.2.6 Small to medium terrestrial mammals

Nineteen species of small to medium sized ground dwelling mammals were recorded during the CRA surveys, using six standard survey methods. These included hair tubes, Elliott traps, scat searches, pitfall traps, spotlight and diurnal herpetofauna searches. Two of the species *Rattus rattus* and *Mus musculus* are introduced fauna. Table 3.2.6 lists the species and the relative frequency with which the species was detected for each of the standard methods during the survey.
Elliott traps (type A) and hair tubes recorded the greatest number of species, detecting 14 and 12 species respectively. Two species, *Pseudomys delicatulus* and *Xeromys myoides* were recorded only from Elliott trapping while *R. lutreolus* was only recorded by hair tubes. Another two species, *Planigale maculata* and *Hydromys chrysogaster* were detected using one method only, by pitfall trapping and spotlighting respectively. *Isoodon macrourus* and *R. lutreolus* was recorded using hair tubes but not recorded from Elliott traps.

The most commonly recorded species during the CRA surveys was *Rattus fuscipes*, which was detected most frequently by Elliott trapping. The second most frequently recorded species was *Melomys cervinipes.* The least frequently recorded species were *X. myoides* and *R. lutreolus.*

TABLE 3.2.6 RESULTS SUMMARY OF CRA SURVEYS TO DETECT SMALL TO MEDIUM TERRESTRIAL MAMMALS

Methods	Spotlight		Pitfall trapping		Scat search		Elliott trapping		Hair-tube trapping		Diurnal herp search	
Number of sites	*273*		*105*		*278*		*264*		*230*		*320*	
Species	Sites	%freq	Sites	%freq	Sites	%freq	Sites	%freq	Sites	%freq	Sites	%freq
Tachyglossus aculeatus	2	0.7			3	1.1					3	0.9

Antechinus flavipes	2	0.7					28	10.6	17	7.4		
Antechinus stuartii			1	0.9			8	3.0	8	3.5		
Planigale maculata			10	9.5								
Sminthopsis murina	1	0.4	4	3.8			2	0.7			3	0.9
Perameles nasuta	13	4.8			2	0.7	1	0.4	6	2.6	8	2.5
Isoodon macrourus	2	0.7			7	2.5			19	8.3	1	0.3
Hydromys chrysogaster	2	0.7										
Melomys burtoni							8	3.0	2	0.9		
Melomys cervinipes			1	0.9			55	20.8	29	12.6		
Mus musculus	1	0.4	7	6.7			40	15.1	33	14.3		
Pseudomys delicatulus							7	2.6				
Pseudomys gracilicaudatus			2	1.9			8	3.0				
Pseudomys patrius			1	0.9			12	4.5	1	0.4		
Rattus fuscipes	3	1.1	1	0.9			74	28.0	52	22.6		
Rattus lutreolus									1	0.4		
Rattus rattus							4	1.5	1	0.4		
Rattus tunneyi							9	3.4	12	5.2		
Xeromys myoides							1	0.4				

3.2.7 Large terrestrial mammals - macropods

Overall the detection frequency for macropods during the CRA survey was low. A total of eight species of macropod were recorded using spotlighting, scat searches and hair tubes. An additional three species (*Macropus parryi*, *Thylogale stigmatica* and *Petrogale penincillata*) were recorded incidentally. Table 3.2.7 lists the species and the relative frequency for which the species was detected for each of the standard methods during the survey. Spotlighting was the most successful method for detecting this group of fauna recording six species. The most commonly recorded macropod species during the CRA survey was *Wallabia bicolor*, which was detected most frequently by scat searches. The least detected species were *Macropus rufogriseus* and *P. herberti*. *Petrogale herberti* is restricted in its distribution to rocky outcrops in the northern section of the bioregion.

TABLE 3.2.7 RESULTS SUMMARY OF CRA SURVEYS TO DETECT LARGE TERRESTRIAL MAMMALS - MACROPODS

Methods	Hair-tubes		Scat search		Spotlight	
Number of sites	*230*		*278*		*273*	
Species	Sites	%freq	Sites	%freq	Sites	%freq
Aepyprymnus rufescens	2	0.9			2	0.7
Potorous tridactylus					1	0.4
Macropus dorsalis					2	0.7
Macropus giganteus			1	0.4	2	0.7
Macropus parryi *						
Macropus rufogriseus	1	0.4				
Petrogale herberti			1	0.4		
Petrogale penicillata *						
Thylogale stigmatica *						
Thylogale thetis			1	0.4	1	0.4
Wallabia bicolor	2	0.9	10	3.6	1	0.4

*denotes species recorded as incidental only

3.2.8 Medium to large terrestrial mammals - predators

Three predator species, *Vulpes vulpes*, *Felis catus* and *Canis familiaris* were recorded during the CRA surveys, using four standard survey methods. These are hair-tubes, scat searches, call playback and spotlighting. Table 3.2.8 lists the species and the relative frequency for which the species was detected for each of the standard methods during the survey. Hair tubes were successful in detecting all three species of predator where as scat searches recorded only *Vulpes vulpes* and *Canis familiaris.* In comparison call play back and spotlighting methods recorded only one species.

The most commonly recorded predator was *Canis familiaris,* which was detected most frequently by scat searches. The least frequently recorded species was *Felis catus* which was detected by hair-tubes only.

TABLE 3.2.8 RESULTS SUMMARY OF CRA SURVEYS TO DETECT LARGE TERRESTRIAL MAMMALS - PREDATORS

Methods	Hair-tubes		Scats		Call play back		Spotlight	
Number of sites	*230*		*278*		*344*		*273*	
Species	Sites	%freq	Sites	%freq	Sites	%freq	Sites	%freq
Vulpes vulpes	1	0.4	4	1.4				
Felis catus	3	1.3						
Canis familiaris	1	0.4	25	8.9	5	1.4	9	3.3

3.2.9 Large terrestrial mammals - ungulates

Two species of ungulates (*Sus scrofa* and *Bos taurus*) were recorded during the CRA surveys, using two standard survey methods including hair-tubes and spotlighting. Spotlighting recorded both species, while hair-tubes recorded only *Bos taurus* (Table 3.2.9). Two additional species, *Equus caballus* and *Cervus elaphus* were recorded incidentally.

TABLE 3.2.9 RESULTS SUMMARY OF CRA SURVEYS TO DETECT LARGE TERRESTRIAL MAMMALS - UNGULATES

Methods		Hair-tubes		Spotlight	
number of sites		*230*		*273*	
Species	Common name	Sites	%freq	Sites	%freq
Equus caballus *	horse (feral)				
Sus scrofa	pig (feral)			1	0.4
Bos taurus	cattle (feral)	1	0.4	1	0.4
Cervus elaphus *	red deer				

*denotes species recorded as incidental only

3.2.10 Arboreal mammals

During the CRA fauna surveys ten species of arboreal mammals were recorded using seven standard survey methods. These including spotlighting, call playback, scat searches, hair-tubes, Elliott traps, nocturnal and diurnal herpetofauna searches. Table 3.2.9 lists the species and the relative frequency for which the species was detected for each of the standard methods during the survey. Spotlighting and call playback provided the most species, detecting nine and seven species respectively. However spotlighting recorded species at a significantly higher frequency of sites than call playback.

The most commonly recorded species was *Petaurus australis*, which was recorded most frequently by spotlighting and call playback methods. This species is known to respond to call playback tapes in particular calls from the powerful owl. The second most recorded species was *P. breviceps* which was detected most frequently by spotlighting. This species is very vocal which increases its detectability. These two species are important prey items for a number of predator priority species including the powerful, sooty, and masked owls. The least frequently recorded species was *Phascogale tapoatafa,* which was recorded at three sites using hair tubes and one site using Elliott traps.

TABLE 3.2.10 RESULTS SUMMARY OF CRA SURVEYS TO DETECT ARBOREAL MAMMALS

Methods	Nocturnal herp search		Elliott Trapping		Hair-tube		Scat search		Call playback		Spotlight	
Number of sites	*252*		*264*		*230*		*278*		*344*		*273*	
Species	Sites	%freq	Sites	%freq	Sites	%freq	Sites	%freq	Sites	%freq	Sites	%freq
Phascogale tapoatafa			1	0.4	2	0.8						
Phascolarctos cinereus							1	0.4	1	0.3	15	5.5
Petaurus australis	3	1.2							34	9.9	38	13.9
Petaurus breviceps	3	1.2					1	0.4	16	4.7	50	18.3
Petaurus norfolcensis	4	1.6	1	0.4					5	1.5	10	3.7
Petauroides volans											44	16.1
Pseudocheirus peregrinus									2	0.6	18	6.6
Acrobates pygmaeus							1	0.4			18	6.6
Trichosurus caninus									3	0.9	15	5.5
Trichosurus vulpecula					31	13.5	1	0.4	6	1.7	30	11

3.2.11 Megachiropteran bats

During the CRA surveys four species of megachiropteran bats were recorded using three standard survey methods. These are harp traps, spotlighting and call playback. One additional species, *Pteropus alecto* was recorded incidentally at Littabella NP. Table 3.2.11 lists the species and the

relative frequency for which each species was detected for each of the standard methods during the survey. All three methods were successful in detecting at least two species of bat. Spotlight and harp trap methods recorded higher frequencies for species than call playback.

The most common species recorded during the CRA surveys was *Pteropus poliocephalus,* which was detected most frequently by spotlighting. The second most recorded species was *Syconycteris australis.* This species was only detected by harp trapping. *Nyctimene robinsoni* and *Pteropus scapulatus* were the least frequently recorded species.

TABLE 3.2.11 RESULTS SUMMARY OF CRA SURVEYS TO DETECT MEGACHIROPTERAN BATS

Methods	Nocturnal bird call playback		Spotlight		Harp trapping	
Number of sites	*344*		*273*		*258*	
Species	Sites	%freq	Sites	%freq	Sites	%freq
*Pteropus alecto**						
Pteropus poliocephalus	4	1.6	12	4.4		
Pteropus scapulatus	3	0.9				
Syconycteris australis					11	4.3
Nyctimene robinsoni			1	0.4	2	0.8

*denotes species recorded as incidental only

3.2.12 Microchiropteran bats

During the CRA fauna surveys 26 microchiropteran bat species were recorded using four standard survey methods including spotlighting, nocturnal bird call playback, harp trapping and ultrasonic call detection, and from two non-standard methods; triplining and mistnetting. An additional species, *Taphozous georgianus*, was not recorded during standard surveys but was detected incidentally during cave searches. Table 3.2.12 lists the species and the relative frequency with which each species was detected during a particular survey. Harp trapping and ultrasonic call detection provided the most species records, detecting 21 and 19 species respectively. Spotlighting and call playback were the least successful methods used to detect bat species, where only two species (*Saccolaimus flaviventris* and *Nyctinomus australis*) were recorded using these methods. However these methods were essential for the detection of the high flying *N. australis,* which emits an audible call. Four species, *Hipposideros ater*, *Kerivoula papuensis*, *Myotis* sp. and *Vespadelus vulturnus* were recorded only from harp trapping, whereas *Mormopterus beccarii* was only detected from ultrasonics. This highlights the importance of using a variety of microbat survey methods to record species diversity.

The most commonly recorded species during the CRA surveys was *Miniopterus australis,* which was detected most frequently by harp trapping, and the second most recorded species was *V. pumilus*. The least frequently recorded species was *H. ater* which was caught in a harp trap at only one site at Blackdown Tableland. However the apparent rarity of this species during the CRA surveys is a reflection of its distribution, which largely falls outside of the SEQ bioregion. Of the priority species, *Myotis* sp. and *V. vulturnus* were the least frequently detected.

TABLE 3.2.12 RESULTS SUMMARY OF CRA SURVEYS TO DETECT MICROCHIROPTERAN BATS

Methods	Spotlight	Nocturnal bird call playback	Harp trapping	Ultrasonic call detection	Triplining	Mistnetting
Number of sites	*273*	*344*	*258*	*294*	*15*	*9*
Species	Sites %freq	Sites %freq	Sites %freq	Sites %freq	Sites %freq	Sites %freq

Rhinolophus megaphyllus					11	4.2	18	6.1				
Hipposideros ater					1	0.4						
Saccolaimus flaviventris	1	0.4					6	2.0				
*Taphozous georgianus**												
Mormopterus beccarii							5	1.7				
Mormopterus sp.							36	12.2	5	33.3	2	22.2
Nyctinomus australis	21	7.7										
Chalinolobus gouldii					22	8.5	31	10.5	4	26.6	5	55.5
Chalinolobus morio					10	3.9	2	0.70				
Chalinolobus nigrogriseus					8	3.1	10	3.40			2	22.2
Chalinolobus picatus					8	3.1					2	22.2
Kerivoula papuensis					10	3.9						
Miniopterus australis					65	25.2	19	6.4	1	6.7	2	22.2
Miniopterus schreibersii					2	0.8	9	3.0			1	11.1
Myotis sp.					2	0.8						
Nyctinomus australis			5	1.5	50	19.9						
Nyctophilus bifax					13	5.0	3	1.0	1	6.7		
Nyctophilus geoffroyi					58	22.5					2	22.2
Nyctophilus gouldi					1	0.4	2	0.6	1	6.7	4	44.4
Scotorepens balstoni					2	0.8						
Scotorepens orion					4	1.5			1	6.7		
Scotorepens sp.					4	1.5			2	13.3	1	11.1
Scoteanax rueppellii					4	1.5			5	33.3	4	44.4
Vespadelus darlingtoni					4	1.5	2	0.6				
Vespadelus pumilus					47	18.2	22	7.4	3	20.0	3	33.3
Vespadelus troughtoni					4	1.5	4	1.3				
Vespadelus vulturnus					4	1.5						

* denotes species recorded incidentally only

4. PRIORITY SPECIES ACCOUNTS

This chapter presents detailed accounts on species identified as priority taxa by the Response to Disturbance project fauna assessment (DNR, DoE and EA, 1998). The ranked list of priority taxa is given in Appendix 2. Information is presented in the form of a written description of the results of the CRA systematic fauna survey and external datasets, and an accompanying map of the SEQ bioregion and Blackdown Tableland presenting the distribution of records for each species. The maps also display post-1974 data with georeferencing precision up to 900m, which was obtained from the GPC incidental database (see report A).

4.1 FROGS

4.1.1 *Adelotus brevis* tusked frog

This species is a medium sized pond or stream dwelling frog. Although common in some areas of south-east Queensland, possible extinction in parts of its range is raising concerns amongst biologists (H. Hines pers. comm.). There appears to be no recent records from the New England Tableland (New South Wales), the western flowing streams of Main Range, or from the Lockyer Valley in south-east Queensland. It has also declined in highland streams in the Eungella Range near Mackay (Ingram and McDonald 1993).

Adelotus brevis was recorded from 24 sites and one incidental site across 11 CRA survey areas. The habitat at these sites included coastal forests, open eucalypt woodland, vine forest, high altitude wet forests and rainforests. They were detected from the Numinbah Valley in the south, through to Kroombit Tops and the Blackdown Tableland in the north. It is interesting to note however, that no individuals were detected in a large area of dry forest from Brooyar, north to the Cordalba and Bania survey areas. However, absence of the species from this area is not certain, as detectability is low in the winter months when most of these areas were surveyed. Methods used to detect *A. brevis* included diurnal and nocturnal herpetofauna searching techniques and pit-fall trapping.

The species was also detected from a high proportion of streams censused during the SEQ Frog surveys, especially from wet forest environments. It was located from a number of pond environments on the coastal lowlands, but was not, however, recorded from intensively monitored streams at Cunninghams Gap and Goomburra SF on the Main Range. Dry forest areas north of Gympie were not included in the SEQ Frog surveys. (Figure 4.1.1).

4.1.2 *Crinia tinnula* wallum froglet

Crinia tinnula belongs to a group of frogs known as acid frogs (Ingram and Corben, 1975), so named for their ability to breed in waters of low pH (high acidity) which are characteristic of the coastal wetlands. Within this group, *C. tinnula* is restricted in its distribution to the coastal heath and wetlands from Littabella NP, near Bundaberg, to Taree, New South Wales (Ehmann, 1996a). Large areas of coastal heath in this bioregion have already been cleared or modified for housing development, agriculture and plantation forestry. Although the species has been recorded in disturbed areas (Ingram and McDonald 1993), the low nutrient and pH status of their preferred habitats are adversely affected by runoff and drainage associated with these developments.

During the CRA surveys, *C. tinnula* was detected during standard and opportunistic nocturnal herpetofauna searches in wallum heath habitat, as well as opportunistically on site. It was recorded at three sites across two survey areas. These were the Cooloola area of the Great Sandy NP, and Littabella NP. These areas are coastal parks with extensive areas of suitable habitat for this species. Other areas of potentially suitable habitat, where the species was searched for and not detected, included Bingera SF and Eurimbula NP.

The species was found at a number of wallum sites on the mainland (Beerwah area, Noosa NP and the Cooloola area of Great Sandy NP) and on North Stradbroke Island during the SEQ Frog surveys. (Figure 4.1.2).

4.1.3 *Limnodynastes salmini* salmon-striped frog

Limnodynastes salmini is a large burrowing frog, which occurs across south-east Queensland, and central inland New South Wales. Cogger (1996) records that the species spends much of the year buried, but after heavy rain they can be found during the day sheltering under logs, loose bark and rocks near breeding ponds. Males call from swamps, culverts, and ephemeral pools in tall grassland from September to April, and eggs are laid as foamy egg mass (Davies and Watson 1994). Historically, *L. salmini* appears to have been widespread within the SEQ bioregion (Ingram and Raven 1991; Davies and Watson 1994). However, the species has since declined in the greater Brisbane area (Czechura 1995a) and records since 1974 suggest a decline throughout the bioregion.

Limnodynastes salmini was not encountered during the CRA surveys, nor was it detected during the SEQ Frog surveys. Although many of the surveys were conducted in winter, the absence of records may also be a result of a lack of search effort in their preferred habitat - low alluvial flats and marshes. (Figure 4.1.3).

4.1.4 *Mixophyes fleayi* Fleay's barred-frog

First described in 1987, *Mixophyes fleayi* is a large, ground-dwelling frog, that is restricted to wet forests of far north-east New South Wales and south-east Queensland (Corben and Ingram, 1987). In south-east Queensland it is known from the Conondale, McPherson and Main ranges, usually in association with permanent rocky streams. *Mixophyes fleayi* is a cryptic species, with most calling activity occurring after wet periods in the warmer months. At other times it shelters by burrowing into leaf litter and friable soil. The species appears to have declined for as yet unknown reasons, and remaining populations may be affected by habitat alteration or loss (eg. cattle grazing), and the impacts of feral plants and animals (H. Hines pers. comm.).

During the CRA surveys, *M. fleayi* was found at one standard site at Goomburra SF, a previously known population. This record was of animals encountered during both a nocturnal herpetofauna search and spotlighting session. In addition, the species was detected incidentally at four locations along rocky creeks within Goomburra SF.

Mixophyes fleayi was the main target of survey and monitoring during the SEQ Frog surveys.

Results of the survey show that there are three major populations; in the heads of streams in Conondale NP, Main Range north of Cunninghams Gap, and the Green Mountains section of Lamington NP. A small population is also known from the Cougal Section of Springbrook NP (data supplied by B. Dadds and C. Morrison, referred to as SEQ Frog Survey records in Figure 4.1.4).

4.1.5 *Mixophyes iteratus* giant barred-frog

The largest of the barred-frogs, *Mixophyes iteratus* reaches the northern limits of its distribution in the Conondale Range, with the majority of the species' range in north-eastern New South Wales (Gilmore and Parnaby 1994). In south-east Queensland, they were also known historically from the Bunya Mountains, Main Range and Border Ranges area (Straughan 1968; Ingram and Raven 1991). Its has been found in rocky creeks at high altitude (Barker, Grigg and Tyler 1995), but its preferred habitat seems to be deep, slow-flowing creeks with overhanging banks in riverine rainforest, particularly at mid-altitude and lowland areas (Gilmore and Parnaby 1994; Mahony, Knowles and Pattinson 1996; E. Meyer pers. comm.).

Despite conducting nocturnal stream-side searches in the Mapelton, Conondale, and Bellthorpe survey areas, *M. iteratus* was not located during any of the CRA surveys. However, this may be a reflection of their seasonality, and the lack of survey effort in their preferred habitat.

During the SEQ Frog surveys, populations of this species were located in the Upper Stanley River, Six Mile and Yabba creeks near Jimna, and in tributaries of the Mary and Maroochy rivers north of Mapelton. It is also currently known from the Caboolture River (C. Marshall pers. comm.). These streams are characterised by deep, slow moving pools. It could not be located at Cunninghams Gap and Goomburra SF, despite intensive surveys and monitoring, nor was it found at locations where it was previously known in the Conondale Range and Bunya Mountains. However, further work is needed to assess these areas. Additional surveys are also required in the foothills of the Border Ranges and the southern section of Main Range. The results of these surveys indicate that the species has declined within the bioregion. (Figure 4.1.5).

4.1.6 *Rheobatrachus silus* southern platypusfrog

Rheobatrachus silus is a nocturnal, and an entirely aquatic species, found in permanent rocky mountain streams and adjacent pools in rainforest and wet sclerophyll forests. The species is best known for its unusual reproductive behaviour - gastric brooding, where the development of the egg and tadpole stage occurs in the female's stomach. *Rheobatrachus silus* is known only from the Blackall and Conondale Ranges in south-east Queensland, and has declined rapidly since it was first described in 1973 (Liem 1973). The last frog to be seen in the wild was in 1981 in the Blackall Range (Richards, McDonald and Alford 1993), and it is now considered likely that the species is extinct (eg. Czechura 1991). The causes of the disappearance of this frog have not been identified (Martin, McDonald and Hines 1997).

No *R. silus* were detected during the CRA surveys. Similarly for the SEQ Frog surveys, it was not detected despite targeted surveys of known or potential sites for this species. (Figure 4.1.6).

4.1.7 *Taudactylus diurnus* southern dayfrog

Taudactylus diurnus is a small, delicate and agile species which is known only from three rainforest areas within the SEQ bioregion, Mount Glorious, the Conondale Ranges, and Kondalilla, near Montville. They have been found in vegetation, debris, amongst rocks, in and beside pools and streams, and generally within 10m of water (Czechura and Ingram 1990). They are considered to be a relatively conspicuous frog, being diurnal, terrestrial, easily observed, and active throughout the year (Czechura and Ingram 1990). Like *Rheobatrachus silus* the species declined rapidly in the

late 1970's, and was last seen in the wild in 1979 in the Conondale Ranges (Czechura and Ingram 1990). It is now probably extinct. The cause of the sudden decline is unclear, although habitat changes caused by feral animals, weed infestation and disease have been implicated (Richards, McDonald and Alford 1993).

During the CRA surveys, nocturnal, as well as diurnal searches of suitable habitat in Conondale NP and Mapelton SF failed to locate the species. The SEQ Frog surveys also failed to detect *T. diurnus*, despite targeted surveys of known or potential sites for this species. (Figure 4.1.7).

4.1.8 *Taudactylus pleione* Kroombit tinkerfrog

This small, ground-dwelling frog has an extremely restricted distribution, as it is only known from rainforest streams on Kroombit Tops in south-east Queensland. *Taudactylus pleione* is a very cryptic species, and is most readily detectable during summer, when males advertise with their loud and distinctive call from within leaf litter or rock crevices in the headwaters of mountain streams. Both a summer and a winter survey of Kroombit Tops failed to detect this species, despite conducting herpetofauna searches of standard sites as well as targeted nocturnal stream-side searches of known *T. pleione* locations. However, this result was not surprising since Czechura (1986b) records that during the period from winter to early summer - when the CRA surveys were undertaken - the frogs are hidden deep within their rock pile or crevice retreats. Subsequent monitoring by QNPWS staff has since detected the species at some known locations (J. Clarke pers. comm.). One site at nearby Many Peaks TR, was identified as having suitable microhabitat for the species, and warrants further investigation during suitable conditions.

A joint survey by DoE, DNR and the University of Queensland targeting this species was conducted at Kroombit Tops in February 1997. The species was detected at several new sites in the very steep headwaters of easterly flowing streams in Kroombit NP. At these sites, *T. pleione* was found in rainforested scree slopes, usually in close proximity to seepage zones at the heads of gullies. It was also located at previously known sites in the head of Kroombit Creek. (These records are referred to as SEQ Frog survey records in Figure 4.1.8).

4.1.9 *Litoria brevipalmata* green-thighed frog

This rare frog occurs along the coastal ranges from near Gosford (Ehmann 1996) north to Childers (P. Grimshaw, unpublished record). It breeds in ephemeral pools, permanent ponds and flooded areas, in or adjacent to, dry forest (Czechura 1978). It is usually encountered after heavy summer rains in noisy aggregations at breeding ponds (Barker, Grigg and Tyler 1995). Such high rainfall events occur infrequently during the warmer months of the year, and breeding lasts just a few days. When not calling, the animal is cryptic and rarely encountered (F. Lemckert, pers. comm; E. Meyer, pers. comm.), making it a very difficult species to survey.

As most of the CRA surveys were conducted during the winter months, the ability to detect *L. brevipalmata* was restricted. However, the species was found at five sites and three incidental locations from three survey areas, and has extended the known range of the species north to Cordalba SF. At Curra SF, a foraging individual was captured during a nocturnal herpetofauna search, on a ridgeline site in an area of dry sclerophyll forest dominated by *Corymbia citriodora* and *Eucalyptus acmenoides*. At Glenbar SF approximately thirty-five frogs were detected. Of these, one animal was captured in a pit-fall trap, the others were found calling at opportunistic survey sites. The SEQ Frog surveys recorded this species at three ephemeral ponds; single calling males at Samsonvale, and near Jimna in SF 207, and a breeding chorus of at least 20 males from SF 792, south of Jimna. Records from both surveys were confined to dry sclerophyll forest. (Figure 4.1.9).

4.1.10 *Litoria freycineti* wallum rocketfrog

Litoria freycineti is a terrestrial frog, which is restricted to coastal lowland areas from Fraser Island (Ingram and Raven 1991) south to central New South Wales (Cogger 1996). In south-east Queensland, it appears to be restricted to wallum areas, where it is active during the spring and early summer breeding season. It is less active during other times of the year, although males will call throughout summer, autumn and late winter, in suitable conditions (E. Meyer pers. comm.). In the SEQ bioregion, threats to this species relate to the destruction of their restricted habitat for real estate development and pine plantations (Ingram and McDonald 1993).

During the CRA surveys, this species was recorded at one standard and one opportunistic survey site, both within the Cooloola area of Great Sandy NP. It was also recorded during the SEQ Frog surveys within Great Sandy NP and in the Beerwah area. The habitat at these sites was low coastal heath, adjacent to permanent acidic and ion poor swamps. The low number of records for this species is a reflection of the specialised habitat requirements of this species within the bioregion and the limited survey effort in this habitat. (Figure 4.1.10).

4.1.11 *Litoria olongburensis* wallum sedgefrog

Litoria olongburensis is confined to the coastal lowlands of south-east Queensland (Ingram and Raven 1991) and north-east New South Wales (Ehmann 1996c). Within the SEQ bioregion it occurs on Fraser, Moreton, Bribie and Stradbroke islands. It also occurs on the mainland, with records from the Beerwah, Perigian and Cooloola areas. The species is dependant on low-nutrient wetlands with acidic waters, which occur on coastal sand deposits (Liem and Ingram 1977). It is usually found in low, dense vegetation associated with permanent water bodies. Like the other acid frogs, *L. olongburensis* is threatened by habitat loss to urban development and forestry plantations (Ingram and McDonald 1993).

Litoria olongburensis was recorded at one systematic site and two opportunistic sites from one CRA survey area within the Cooloola area of Great Sandy NP. It was found during nocturnal herpetofauna searches, in permanent pools and reed beds, adjacent to wallum heath. During the SEQ Frog surveys it was found in the Beerwah area, Great Sandy NP, Noosa NP and on North Stradbroke Island. In the latter two areas, large populations were found in association with extensive coastal swamps. The overall low number of records for this species is a reflection of their specialised habitat requirements, the limited survey effort in their preferred habitat, and the time of the year when most surveys where undertaken. (Figure 4.1.11).

4.1.12 *Litoria pearsoniana* cascade treefrog

Litoria pearsoniana is a tree-frog endemic to south-east Queensland and north-east New South Wales. It occurs in rainforest and thickly forested gullies, in association with flowing rocky streams (McDonald and Davies 1990). In winter *L. pearsoniana* is known aggregate under rocks, or in cracks in rocks or wooden bridge girders (McDonald and Davies 1990). However, the species is relatively conspicuous in spring and summer, when males call from overhanging riparian vegetation or from rocks in or near streams.

Litoria pearsoniana suffered a major population decline in the late 1970s to early 1980s (Ingram and McDonald 1993), the reasons for which are poorly understood. McGuigan *et al.* (in press) record that population densities appear to have recovered at some sites, and their frequent occurrence in suitable habitat during the CRA and SEQ Frog surveys supports this. The species was located from eleven sites (and two incidental locations), at eight CRA survey areas, and from a high proportion of SEQ Frog survey sites; extending from Main Range NP, Numinbah SF and Lamington NP near the New South Wales border, through the D'Aguilar, Conondale and Blackall Ranges to Kandanga SF in the central part of the bioregion.

All frogs were found within typical habitat, but some were found at elevations as low as 100 m (Mount Mee SF). This is in contrast to McDonald and Davies (1990), who report that this species only occurs at higher elevation. Our results instead support the findings of Gilmore and Parnaby (1994), who note that the species is not limited by elevation, as long as stream and vegetation requirements are met. (Figure 4.1.12).

4.1.13 *Litoria revelata* whirring treefrog

This medium-sized treefrog appears to be distributed in three disjunct populations along the east coast of Australia (Ingram, Corben and Hosmer 1982), but within the bioregion, it occurs only in the south-east corner, in the McPherson Range (Ingram and Raven 1991). Here, it inhabits montane forests, where it breeds in still water. *Litoria revelata* is most easily detected during its late summer to early autumn breeding season, when the males call from emergent or overhanging vegetation (Ingram, Corben and Hosmer. 1982), but can also be detected at other times of the year in suitable wet weather.

The only CRA survey area that lies within its known range was Numinbah SF, which was surveyed in spring. It was not detected here or at any other CRA survey area. During the SEQ Frog surveys, it was recorded from four ponds in rainforest and dry sclerophyll forest on O'Reillys Plateau in the Border Ranges (Figure 4.1.13).

4.1.14 *Litoria sp. cf. barringtonensis* (Kroombit Tops) no common name

This small hylid, which inhabits the margins of streams in Kroombit Tops, has previously been assigned to the species *Litoria pearsoniana* (eg. Czechura, 1986a). However, recent genetic studies indicate that this taxa is more closely aligned to *L. barringtonensis* (Mahony and Knowles 1994; K. McGuigan pers. comm.), a species found only in New South Wales. Furthermore, sufficient genetic differences occur between the Kroombit Tops population and *L. barringtonensis* to consider the former a separate species.

Litoria sp. cf. barringtonensis inhabits rainforest, closed and open forest, closely associated with mountain streams. In spring and summer, males call from rocks and overhanging riparian vegetation. During the CRA surveys, the species was located at three sites at Kroombit Tops SF, all during nocturnal stream-side searches. In winter, (late August), one female was located on overhanging riparian vegetation during a nocturnal herpetofauna search of an opportunistic site. The remaining records are from two sites (one standard, one opportunistic), surveyed in December. A joint survey by DoE, DNR and the University of Queensland of streams in Kroombit Tops in February 1997 detected this species in the headwaters of Kroombit, Three Moon and Munholme creeks (referred to as SEQ Frog survey records in Figure 4.1.14).

4.1.15 *Litoria sp. cf. cooloolensis* (North Stradbroke Is) no common name

Recent studies of the Cooloola sedgefrog *Litoria cooloolensis* have revealed that the isolated North Stradbroke Island population has considerable differences from mainland populations, in both genetics and mating call (James 1996). Although further work is required to clarify the taxonomic status of the North Stradbroke Island populations, we have treated them as a separate taxa, *L. sp. cf. cooloolensis*, based on the reported differences and the large geographical separation from typical *L. cooloolensis*.

Litoria sp. cf. cooloolensis is restricted to reed beds surrounding the island's acid lakes and swamps. Little of this habitat is reserved, with the majority of its distribution under mining leases (H. Hines, pers. comm.). Mining has already caused the lowering of water tables at several lakes (Durbidge and Covacevich 1981), and other threats to the species include tourist development and the extraction of drinking water from the islands swamps for use on the mainland.

This species was not detected during the CRA or SEQ Frog surveys since Stradbroke Island was not assessed. (Figure 4.1.15).

FIGURES 4.1.1 TO 4.1.15 PRIORITY FROG DISTRIBUTIONS THROUGHOUT SEQ BIOREGION AND BLACKDOWN TABLELAND

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4.2 REPTILES

4.2.1 *Elusor macrurus* Mary River turtle

Only recently described, *Elusor macrurus* is a little-known chelid whose distribution appears to be confined to the Mary River drainage area in south-east Queensland (Cann and Legler, 1994). The species is omnivorous and shares many behavioural characteristics with other species of short-necked turtle (Cann and Legler, 1994). Nesting occurs from late October, in favourable areas of riparian habitat, and illegal collecting of eggs and hatchlings is known to occur (S. Flakus, pers. comm.). Other threats to this species include the clearing of riparian vegetation, sand mining, damming, and intensive cattle grazing throughout the catchment.

Elusor macrurus was not detected from any of the five CRA survey areas that lie within the Mary River catchment. However, turtle trapping was only carried out opportunistically, and the species is known to avoid baited traps (Cann and Legler, 1994). The species is captured and so identified by diving onto swimming turtles and catching them by hand (Cann and Legler, 1994), a method not employed during the CRA surveys. (Figure 4.2.1).

4.2.2 *Delma plebeia* common delma

Delma plebeia is a large delma that is restricted to dry sclerophyll forests and woodlands, usually with a grassy understorey. It is endemic to south-east Queensland and northern New South Wales, and does not appear to extend any further north than about the Gympie area (Ingram and Raven 1991), although these areas remain poorly surveyed.

Only one *D. plebeia* was only recorded at one standard site during the CRA surveys; on a ridge at Deongwar SF, near Crows Nest. The habitat at this site comprised iron-bark woodland with a thick understorey of grass, including *Themeda trianda*. (Figure 4.2.2).

4.2.3 *Delma torquata* collared delma

Delma torquata is a small legless lizard, first described in 1974 (Kluge, 1974). The known range of this species is largely restricted to the south-east corner of Queensland from Gympie, west to the Bunya Mountains, and south to the western suburbs of Brisbane.

Delma torquata was recorded by diurnal herpetofauna searches and in a pit-fall line at three new localities during the CRA surveys. These were Yarraman SF, Grongah SF and Blackdown Tableland NP. The habitat at these sites consisted of iron bark woodland or hoop pine scrub on heavy, black, cracking clay soils. The specimen caught at Blackdown Tableland represents a significant range extension for this species. This, and a historical record from Gladstone, represent the only two records for this species north of the Gympie area. (Figure 4.2.3).

4.2.4 *Paradelma orientalis* brigalow scaly-foot

Paradelma orientalis is a large, robust legless lizard. Little is known of its biology. It is largely restricted to the Brigalow bioregion, although some records also occur in the Gladstone area, including Boyne Island. Habitat has been recorded as predominantly ironbark *Eucalyptus crebra* woodland, *Acacia harpophylla* woodland and on Boyne Island, *Acacia falciformis* woodland (Schulz and Eyre, 1997). Much of the habitat within this species' range is heavily disturbed and under threat from further land clearing (McDonald, *et al.* 1991).

Only one *P. orientalis* was recorded during the CRA surveys. This was found during an opportunistic diurnal herpetofauna search at Blackdown Tableland NP. This site consisted of an

area of ironbark *E. crebra* woodland, situated on basalt derived, black, cracking clay soils. This vegetation community appeared to be unique within Blackdown, as the majority of the soils in the tableland were sandstone derived. (Figure 4.2.4).

4.2.5 *Chlamydosaurus kingii* frilled lizard

These large and spectacular lizards are widespread across northern Australia in subhumid to semi-arid grassy woodlands and dry sclerophyll forests (Wilson and Knowles 1988). South-east Queensland represents the southern most limit of their distribution. In this area, they appear to be restricted to lowland woodlands. Primarily arboreal, *C. kingii* show a preference for perches high in the dense canopies of tall trees (Griffiths and Christian 1996a). *Chlamydosaurus kingii* are most active during the November/December mating season, with males having a mean activity range of 2.5 ha (Shine and Lambeck 1989). However, activity patterns are highly seasonal, and the lizards are inactive during the drier and cooler months of the year (Shine and Lambeck 1989). The diet consists of a diverse range of invertebrates, and food is more accessible after fire due to the removal of ground vegetation (Griffiths and Christian 1996b).

In south-east Queensland, *C. kingii* have experienced a dramatic population decline since the 1960s (Wilson and Knowles 1988). Remaining populations occur in remnants of lowland woodlands, and remain threatened by continued clearing for agriculture and coastal development, and possibly through the effects of changing fire regimes (DNR, DoE and EA 1998). During the CRA surveys, *C. kingii* was sighted at one standard site from Warro SF, and was also incidentally encountered along roadsides at Warro SF and the Cooloola area of Great Sandy NP. The overall paucity of records is probably a reflection of their arboreal and cryptic habits, and their inactivity during the winter months, when most of the surveys were undertaken. (Figure 4.2.5).

4.2.6 *Anomalopus leuckartii* no common name

Anomalopus leuckartii is a fossorial skink often encountered in soft soil beneath rocks, logs or leaf litter in eucalypt and callitris forests and woodlands (Wilson and Knowles 1988; Cogger 1996). It has a patchy distribution within south-east Queensland (Ingram and Raven, 1991) and also occurs on the western slopes and ranges of northern New South Wales (Cogger 1996). Suspected threatening processes for this species include modification of microhabitats from grazing and inappropriate fire regimes (DNR, DoE and EA 1998).

Within the CRA survey areas, *A. leuckartii* was only found at Tarong SF. In total, ten individuals were detected at two standard sites and another two opportunistic sites, all during standard diurnal herpetofauna searches. (Figure 4.2.6).

4.2.7 *Eremiascincus richardsonii* broad-banded sand swimmer

Eremiascincus richardsonii is a nocturnal, burrowing skink found in a wide variety of arid or drier habitats, including woodlands, shrublands or hummock grasslands, on sandy or loam soils (Wilson and Knowles 1988; Cogger 1996). Its distribution extends over most of semi-arid and arid Australia. In the SEQ bioregion, this species is known from only a few known localities. These include the dry areas of the Lockyer and Brisbane valleys, and two records from the Eurimbula area in the north of the bioregion (Ingram and Raven, 1991).

Eremiascincus richardsonii was not detected during the CRA surveys. Its absence probably reflects its marginal distribution in the study area, and also a lack of summer sampling in areas of suitable habitat in south-east Queensland. (Figure 4.2.7).

4.2.8 *Eroticoscincus graciloides* elf skink

Eroticoscincus graciloides is a small lizard endemic to south-east Queensland (Cogger, 1996). It

occurs in isolated populations in vine thickets, rainforests and wet sclerophyll forests of lowlands and coastal ranges from Fraser Island south to the Ipswich area. This species lives in deep litter and under logs and rocks in shady, damp areas (Wilson and Czechura 1995), especially near streams. It is intolerant of sunlight and possible threats to the species include habitat loss or alteration (such as clearing and selective logging) which may open canopy cover, lower moisture levels and reduce litter accumulation (DNR, DoE and EA 1998).

Eroticoscincus graciloides was detected at eight sites from four CRA survey areas, all within the known range of the species. The species was found during diurnal and nocturnal herpetofauna searches on standard sites, and during opportunistic searches. All records were from typical habitat: vine forest, rainforest or wet sclerophyll forest/rainforest ecotones. (Figure 4.2.8).

4.2.9 *Nangura spinosa* Nangur skink

Nangura spinosa is a large and distinctively spiny, burrowing skink. Until the commencement of the CRA surveys, it was only known from one locality. This consisted of a 300 m section of dry, gently sloping creek embankment within a semi-evergreen vine thicket in Nangur SF, north of Murgon, south-east Queensland (Horsup, James and Porter 1993). It is considered vulnerable due to its highly restricted distribution.

A new population of *N. spinosa* was discovered during the CRA surveys. This was found during a standard diurnal herpetofauna search in a patch of araucarian notophyll vine forest in Oakview SF. Here, one adult and one juvenile were removed from a burrow that was dug into a road embankment. Additional searches at the site revealed a further 23 adults, one sub-adult and twelve juveniles (Hannah *et al.* 1997). This site remains as only the second known locality for this species to date. Searches in similar vegetation types within the bioregion failed to reveal any further evidence of this species.

Possible threats to this species include disturbance by hoop pine logging operations, fuel reduction burning, fire break clearing, and soil disturbance from cattle grazing. Collecting and poaching are also considered risks to this species (DNR, DoE and EA 1998). (Figure 4.2.9).

4.2.10 *Ophioscincus truncatus truncatus* no common name

Ophioscincus truncatus is a small fossorial skink endemic to south-east Queensland and northern New South Wales (Cogger 1996). Two subspecies of *O. truncatus* are currently recognised: *O. t. monswilsonensis* is restricted to the moist forests of the McPherson and Blackall Ranges, and *O. t. truncatus*, occurs on the islands of Moreton Bay. Very little is known of *O. t. truncatus'* biology or habitat requirements, other than that it occurs in drier forest types. This subspecies was not detected during the CRA surveys, since no surveys were conducted on these islands. (Figure 4.2.10).

4.2.11 *Saiphos equalis* no common name

Saiphos equalis is a slender burrowing skink, common in New South Wales, where it is often found in gardens and composts (Cogger 1996). It is however, much rarer in south-east Queensland, where it reaches the northern most limit of its known range. Within the bioregion, its distribution is poorly known, but it occurs within the McPherson Range, and along the Main Range north to the Toowoomba area. Scattered records also occur from further north along the western edge of the bioregion, and from what appears to be an isolated population at Kroombit Tops (Ingram and Raven 1991). Little is known of the species' habitat requirements, but it tends to be found on volcanic soils.

This species was detected at one standard site and two opportunistic sites from three CRA survey

areas; Kroombit Tops, Cherbourg and Numinbah state forests. An additional incidental record was collected from Cherbourg SF. All individuals were detected using either pit-fall trapping or diurnal herpetofauna searching techniques. (Figure 4.2.11).

4.2.12 *Acanthophis antarcticus* common death adder

Acanthophis antarcticus is widely distributed throughout continental Australia except for the far north, central desert regions and wetter parts of Victoria and south-east New South Wales (Cogger 1996). It inhabits a wide range of forest types, including rainforest, dry sclerophyll forest, wet sclerophyll forest, and woodlands. The species also occurs in mixed coastal forest and heathland, usually on well drained soils with a deep leaf litter layer. In southern Queensland, this species is known from both the mainland and also from the sand islands, but appears to be declining in this, and other parts of its range (Wilson and Knowles 1988). Suspected threatening processes include clearing and alteration of microhabitats (Wilson and Knowles 1988).

During the CRA surveys, single individuals were recorded during opportunistic diurnal searches at both Kroombit Tops SF and Squirrel Creek SF. In addition, one individual was recorded opportunistically on a standard survey site at Kandanga SF. The species was detected in closed forest at Kandanga and Squirrel Creek, and wet sclerophyll forest at Kroombit Tops. (Figure 4.2.12).

4.2.13 *Furina dunmalli* Dunmall's snake

Furina dunmalli is an extremely rare snake, endemic to Queensland. Its distribution appears to be largely restricted to the Brigalow Belt (McDonald *et al.* 1991) with just a few records occurring in the SEQ bioregion. These include museum specimens from the Tarong and Gladstone areas and sightings from Rosedale near Bundaberg (Cogger *et al.* 1993). The decline of *F. dunmalli* has largely been attributed to the loss of brigalow vegetation communities to which it seems to depend (McDonald *et al.* 1991). The majority of the Brigalow region has been cleared and little of the remnant vegetation is free from disturbance.

Little is known of the biology of *F. dunmalli*, other than that it is nocturnal and feeds on skinks (Shine 1981). The species was not recorded during the CRA surveys. (Figure 4.2.13).

4.2.14 *Hemiaspis damelii* grey snake

Hemiaspis damelii is a small snake, growing to about 50 cm in length. Its distribution extends from the interior districts of central New South Wales, northwards into the Darling Downs (Wilson and Knowles 1988). The species appears to be extra-limital in the SEQ bioregion, with small populations occurring in woodland and wetland areas situated on heavy cracking clays. These populations are under constant threat from agriculture and urban development.

Hemiaspis damelii was not recorded during the CRA surveys. This in part reflects the species scarcity, but also the lack of survey effort in its preferred habitat: woodland on cracking clay soils. (Figure 4.2.14).

4.2.15 *Hoplocephalus bitorquatus* pale-headed snake

Hoplocephalus bitorquatus has a patchy distribution which extends along the coast, ranges and western slopes of eastern Australia from north of Sydney, New South Wales, to Cape York Peninsula, Queensland (Cogger 1996). It is a nocturnal and arboreal species which shelters beneath decorticating bark on trees, or in hollow trunks and limbs of dead trees, especially in the vicinity of watercourses (Wilson and Knowles 1988). Threatening processes include forest management processes such as timber harvesting and prescribed burning that remove large trees which provide suitable shelter (Gilmore and Parnaby 1994).

This species was not detected during the CRA surveys, a possible reflection of its specialised habitat requirements and a patchy distribution within the study area. (Figure 4.2.15).

4.2.16 *Hoplocephalus stephensii* Stephen's banded snake

Hoplocephalus stephensii occurs in the coastal ranges from near Gosford, New South Wales, north to Kroombit Tops in Queensland. It is found in a wide variety of habitats including dry rainforest, sub-tropical rainforest, wet and dry sclerophyll forests and rocky outcrops (Wilson and Knowles 1988; Cogger 1996). Gilmore and Parnaby (1994) note that an important feature of its habitat appears to be the close proximity of mesic and xeric forest formations. *Hoplocephalus stephensii* is an arboreal species which utilises gaps between decorticating bark and tree trunks for daytime shelter (Gilmore and Parnaby 1994). It is predominantly nocturnal, feeding on small vertebrates such as small mammals, lizards, frogs and possibly birds.

Only a single individual was detected during CRA surveys. This was an adult observed on a forestry track shortly after dusk in Wrattens SF. Short seasonal activity periods (this species is active only during late spring to early autumn) helps explain the lack of records for this species during this surveys. (Figure 4.2.16).

4.2.17 *Pseudechis guttatus* spotted black snake

Pseudechis guttatus inhabits a variety of subhumid, habitats including black-soil river floodplains, dry sclerophyll forest and woodlands (Wilson and Knowles 1988; Cogger 1996). In these habitats, the species utilises fallen timber, abandoned burrows and soil cracks for shelter (Gilmore and Parnaby 1994). Its distribution extends from mid-eastern New South Wales to south-east Queensland, although within this region it is most widespread west of the Dividing Range (Wilson and Knowles 1988). Within the SEQ bioregion, *P. guttatus* was once common on the black soil plains of the Lockyer Valley. However, it is now scarce at this and other locations, possibly due to increased rural development of these areas.

No *P. guttatus* were recorded during the CRA surveys - reflecting their general scarcity in the study area, and possibly a lack of sampling in suitable habitats. (Figure 4.2.17).

FIGURES 4.2.1 TO 4.2.17 PRIORITY REPTILE DISTRIBUTIONS THROUGHOUT SEQ BIOREGION AND BLACKDOWN TABLELAND

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4.3 BIRDS

4.3.1 *Erythrotriorchis radiatus* red goshawk

The red goshawk is difficult to observe and is seldom encountered due to its solitary, skulking habits. It occurs in coastal and subcoastal areas from north-eastern New South Wales north to Cape York and west across the Top End to the Kimberley region (Blakers, Davies and Reilly 1984, Debus 1998). Its preferred habitats are comprised of forest and woodland with a mosaic of vegetation types, permanent water and large populations of birds (Aumann and Baker-Gabb 1991, Marchant and Higgins 1993). Prey consists predominantly of birds, including a diverse species array including waterfowl, herons, parrots, kookaburras and pigeons. Less frequently it takes mammals (predominantly flying-foxes), reptiles and large insects (Marchant and Higgins 1993). Prey is captured by a range of techniques, typically ambush-hunting from concealed perch sites; seizing prey as the result of stealth glides or by direct aerial pursuit. As a result of these feeding techniques it prefers forests of intermediate density, or the ecotones between habitats of differing densities. Such habitats are open enough to allow aerial pursuits to occur, but also provide enough cover for ambush hunting (Marchant and Higgins 1993).

There are few documented red goshawk breeding records. Nests are typically located in tall, living trees, in open forest or woodland, within one kilometre of permanent water. Although probably always uncommon, this species has declined and the breeding range has contracted in the southern parts of its range, probably as the result of extensive habitat loss through land clearing, drainage of wetlands and the establishment of extensive pine plantations (Marchant and Higgins 1993, Debus 1998).

Two single individuals were recorded in the CRA surveys, both as incidental sightings. One bird was observed gliding low over the ecotone of Araucarian notophyll vine forest and open forest along a tributary of Kroombit Creek in Kroombit Tops SF. This locality was within 10 km of an individual sighted at Annies Creek in 1994 (Schulz 1994a). The second bird was encountered flying along a creek in dry sclerophyll forest in the Mt Walsh area. This creek had some pools, and was bordered by a narrow strip of riparian vegetation which contained some rainforest species. (Figure 4.3.1).

4.3.2 *Lophoictinia isura* square-tailed kite

The square-tailed kite is widespread, but sparsely distributed throughout mainland Australia, occurring mainly in the coastal and subcoastal areas (Marchant and Higgins 1993). It mainly occurs in open forests and woodlands, particularly those on fertile soils and with abundant passerines (Storr 1973, Marchant and Higgins 1993). It has been described as a “tree-top harrier”, specialising at flying low and slowly through or adjacent to the canopy of trees or shrubs. Here it plunges after prey, including passerines, eggs and young in bird nests and insects (Schulz 1983, Marchant and Higgins 1993, Debus 1998). This raptor appears to undertake regular seasonal movements, moving south in the summer (Blakers, Davies and Reilly 1984). Occasional individuals range into the more vegetated suburbs of Brisbane, where it feeds on introduced and native passerines (Czechura 1995b). There are few documented breeding records throughout its range and its recruitment rate is low. Nests are typically located in mature living trees in forest or woodland of at least several hundred hectares in size (Marchant and Higgins 1993). Although probably always uncommon, the square-tailed kite is thought to have declined due to the extensive clearing of suitable forest and woodland habitat (Debus and Czechura 1989, Debus 1998).

This species was only recorded from two systematic sites and was seen twice incidentally in Cordalba and Wongi state forests during the CRA surveys. A pair were regularly seen in the north-east section of Cordalba SF and were suspected to be breeding. It is rare to encounter pairs, even where resident (Marchant and Higgins 1993). All sites were from drier open forest types, with the

exception of one locality in Cordalba SF which was on the edge of an extensive pine plantation. (Figure 4.3.2).

4.3.3 *Rallus pectoralis* Lewin's rail

The Lewin's rail is a ground dwelling bird of swamps, swampy woodlands and the dense vegetation (rushes and reeds) along watercourses. It is visually cryptic and rarely seen (Chapman and Clayton 1988). Blakers, Davies and Reilly (1984) describe them as uncommon and patchy in suitable habitat from Townsville through to western Victoria.

No sightings of Lewin's rail were made during the CRA surveys. However, little of its habitat was surveyed, and the species is difficult to detect without targeted surveys. Therefore, few conclusions can be drawn from the absence of records. (Figure 4.3.3).

4.3.4 *Turnix melanogaster* black-breasted button-quail

Black-breasted button-quail are quiet, cryptic, ground-dwelling insectivores that forage in the litter of dry rainforests and shrubby woodlands. Small, isolated populations are confined to restricted habitat in the SEQ bioregion (Hamley, Flower and Smith 1997). Black-breasted button-quail aggregate in small parties of four to five individuals, usually comprising a female and several males. Movements are within a defended territory.

Black-breasted button-quail are cryptic birds that typically occur in dense, low vegetation. Sightings are easily missed in standard surveys. Black-breasted button-quail are most easily detected by their circular scratchings, known as platelets, in the forest litter. However, these are similar to platelets made by the painted button-quail and were only used as evidence of the former where the species had been seen or heard in the same area.

Black-breasted button-quail were found at 25 sites within six CRA survey areas. Of these, 11 were detected on systematic sites, with the other 14 recorded incidentally. All records were within their expected habitat and distribution. The majority of records were from the Yarraman district. (Figure 4.3.4).

4.3.5 *Geophaps scripta scripta* squatter pigeon (southern subspecies)

Squatter pigeons are largely ground foraging birds that feed on the seeds of grasses in woodlands and river flats, usually close to water (Frith 1988). They occur east of the Great Divide from the base of Cape York to Gladstone, extending inland further south (Blakers, Davies and Reilly 1984). This southern inland extension appears to have contracted in historical times, probably due to increased grazing pressure . The distribution encompasses most of the bioregion but records are sparse south of Bundaberg (Blakers, Davies and Reilly 1984).

The majority of the CRA survey areas were too heavily forested to be suitable habitat for the squatter pigeon. The species was recorded incidentally from the vehicle at three sites along roadsides away from the survey areas. (Figure 4.3.5).

4.3.6 *Ptilinopus superbus* superb fruit-dove

Superb fruit-doves are small fruit-eating birds of rainforests and rainforest edges, but will move between isolated fruiting trees. They are largely restricted to the eastern edge of Queensland and are sporadically recorded further south to Victoria (Blakers, Davies and Reilly 1984). It appears that the superb fruit-dove does not breed or commonly reside within the bioregion, but instead occur as irregular migrants or vagrants. The species is cryptic, but gives out distinctive calls during the spring-summer breeding season and are unlikely to be missed at this time of the year.

No records of superb fruit-doves were made during the CRA surveys, although a number of systematic sites were within potentially suitable habitat. It is likely that they are genuinely rare in the bioregion. (Figure 4.3.6).

4.3.7 *Calyptorhynchus lathami* glossy black-cockatoo

Glossy black cockatoos are wide ranging specialist seed-eaters that require fruiting *Allocasuarina* trees (Saunders 1988). They move locally to where *Allocasuarina* fruits are available and more widely otherwise (Blakers, Davies and Reilly 1984; Saunders 1988). They live in groups of two to nine individuals, but pairs or families of up to four members will roost separately (Blakers, Davies and Reilly 1984). The species requires tree-hollows for nesting, often in the form of hollow limbs or cavities within dead trees (Forshaw and Cooper, 1978). Glossy black-cockatoos are found throughout the SEQ bioregion, where suitable habitat exists.

Glossy black-cockatoos are conspicuous due to their large size and their distinctive call, and were recorded at 50 sites across 15 CRA survey areas throughout the bioregion. The species was detected during 15 standard diurnal bird surveys and incidentally on systematic sites at another ten. The remaining 25 sites were incidental sightings, mostly from within those same survey areas. (Figure 4.3.7).

4.3.8 *Cyclopsitta diophthalma coxeni* Coxen's fig-parrot

Fig-parrots *Cyclopsitta diophthalma* are small, dietary specialists, feeding predominantly on the seeds of figs. The southern race, Coxen's fig-parrot *C. d. coxeni*, occurs in rainforest and open forest, and has been documented feeding in isolated trees in cleared areas. Its preferred habitat originally appears to have been lowland rainforest in south-east Queensland and north-east New South Wales, however much of this has now been cleared and fragmented. The subspecies is now extremely rare, with few records known from within south-east Queensland for the last ten years (Garnett 1992; Gynther 1998). Most sightings are from higher altitude forests which are still largely intact. Modeling using BIOCLIM predicts a potential range for this species from near Gladstone to the central New South Wales coast (Holmes 1990). However, recent records from Queensland are only from locations in the McPherson, Main and Conondale Ranges, although there are a number of unconfirmed records from coastal and riparian forest near Bundaberg (I. Gynther pers. comm.).

During the CRA surveys there was one unconfirmed record on a systematic site in Goomburra SF. The species is difficult to detect in its preferred habitat, but it is likely that the lack of records in the CRA surveys reflects their true rarity. (Figure 4.3.8).

4.3.9 *Ninox strenua* powerful owl

The distribution of the powerful owl extends along the Great Divide from southern Victoria to the Rockhampton area of central Queensland (Blakers, Davies and Reilly 1984). However, a recent record from the Clarke Range has extended the known range of this species to the north of Eungella (Eyre and Schulz 1996). Powerful owls are large birds which maintain territories of up to 1000 hectares. Their territories can include a variety of forest types, although they are essentially birds of open and tall open eucalypt forest (Debus and Chafer 1997). Powerful owls prey predominantly on small to medium sized arboreal mammals, as well as flying foxes, and are also known to feed on small birds (Pavey, 1994).

During the CRA surveys, powerful owls were detected at 23 survey areas, including 18 systematic sites four opportunistic sites and one incidental record. Most records were obtained during call playback sessions, in a range of forest types spread throughout the bioregion. (Figure 4.3.9).

4.3.10 *Tyto novaehollandiae* masked owl

The masked owl inhabits sclerophyll forests in coastal and subcoastal Australia. It appears to be widespread within its range, although it usually occurs in low densities. Home ranges usually include an open or cleared area beside a forest edge, from which they hunt. Masked owls nest in caves, or large hollows within tall live or dead trees (Debus and Rose 1994; Gilmore and Parnaby 1994). Individuals feed on a variety of prey, including small to medium-sized mammals, particularly rats. Threatening processes relate primarily to habitat reduction, particularly the loss of large hollow trees, and possibly a reduction in prey availability (Debus and Rose 1994; Schodde and Mason 1980).

The masked owl is considered to be the least readily detected of the large forest owls, being the least responsive to call playback techniques (Debus 1995). The species was recorded at 20 sites within 14 survey areas during the CRA surveys. Nine of these records were responses to standard nocturnal bird call playback sessions, five were seen during spotlight searches, while the remaining six records were incidental records. However, several of the latter records are of owls detected up to an hour after a call playback session was completed and so cannot be assumed to be independent of the technique. A number of the records were of owls in rainforest and vine forest with emergents, providing support for recent published evidence (Kavanagh and Murray 1996) that the species may hunt in closed forests as well as more open forest types. (Figure 4.3.10).

4.3.11 *Tyto tenebricosa* sooty owl

Sooty owls occur on the eastern side of the Great Dividing Range, from Victoria north to south-east Queensland. Within Queensland, they occur as far north as Cooloola and the Conondale ranges (Blakers, Davies and Reilly 1984), with recent records of isolated populations at Eungella NP and Kroombit Tops (Hobcroft 1997). Sooty Owls are restricted to rainforests and tall wet forests and predominantly feed on small terrestrial and arboreal mammals (Calaby 1988). They maintain territories of two to eight square kilometres (Blakers, Davies and Reilly 1984), and so may venture some distance into open country.

Sooty owls were found at 12 systematic sites in six CRA survey areas. A further eight records were obtained at opportunistic sites, mostly within these survey areas. Most records were obtained during standard call playback sessions in typical habitat.

4.3.12 *Podargus ocellatus plumiferus* plumed frogmouth

The plumed frogmouth is a large, nocturnal insectivore and predator of small vertebrates, that is restricted to rainforests and rainforest margins (Chapman 1988). The species is restricted to suitable habitat on the eastern side of the Great Dividing Range, between Lismore in northern New South Wales, north to the Many Peaks Range within the SEQ bioregion (Corben and Roberts 1993). Pairs maintain year round territories of several hectares (Smith *et al.* 1994). They are nocturnal and cryptic in dense habitat but have loud distinctive calls and respond readily to call playback techniques. This species has declined in south-east Queensland due to clearing and fragmentation of its habitat (Corben and Roberts 1993).

During the CRA surveys, plumed frogmouths were recorded on 15 systematic and 19 opportunistic sites. These sites were within 12 survey areas and all but two were detected with a standard call playback technique. Twenty-five of the 34 sites recorded one or two birds responding, with the remaining sites recording three to five individuals. The latter were presumably pairs with juveniles, or were pairs at territory boundaries. (Figure 4.3.12).

4.3.13 *Menura alberti* Albert's lyrebird

Albert's lyrebirds are large, mostly ground dwelling insectivores, which forage in the litter of

upland wet sclerophyll forests and rainforest (Robinson 1988). They have a very restricted range, which straddles the Queensland-New South Wales border from the lower Richmond Valley, New South Wales, to the Mistake Range in south-east Queensland. A population isolate occurs at Tamborine mountain, although Blakers, Davies and Reilly (1984) comment that this population may be too small and isolated to survive.

Male and female Albert's lyrebirds maintain overlapping territories during the winter breeding season. They are reliably detectable at this time of the year, as males are very vocal with distinctive calls. Outside of this time, they disperse more widely within small groups (Blakers, Davies and Reilly 1984), are less vocal, and harder to detect. The CRA surveys conducted within the range of the Albert's lyrebird were conducted towards the end of the breeding season.

In total, Albert's lyrebirds were found at only eight sites in two CRA survey areas, Main Range NP and Goomburra SF. The species was detected near four standard sites during surveys and incidentally at another two. All records were within the expected distribution and habitat of the species. (Figure 4.3.13).

4.3.14 *Atrichornis rufescens* rufous scrub-bird

Rufous scrub-birds are small, ground-dwelling birds that feed in thick leaf litter in upland temperate rainforests (Smith 1988). This habitat is restricted to the crest of ranges, from Mt. Mistake, Queensland, south to Barrington Tops, New South Wales (Blakers, Davies and Reilly 1984). It has also been recorded in high altitude heath at Mt Barney NP (D. Stewart, pers. comm.). Within its rainforest habitat, the rufous scrub-bird is restricted to areas of dense ground cover (Gilmore and Parnaby 1994). It occurs in low densities, with animals occupying large territories. Smith (1988) describe densities of males within prime habitat as four individuals per square kilometre.

Rufous scrub-birds are cryptic and are rarely seen within the dense ground cover that they inhabit. However, during the breeding season, which extends through winter and into early spring (Smith 1988), males emit a loud territorial song, which greatly increases the detectability of the species. The rufous scrub-bird was not recorded during the CRA surveys. (Figure 4.3.14).

4.3.15 *Climacteris erythrops* red-browed treecreeper

The red-browed treecreeper is an ecological specialist, gleaning insects from the bark of eucalypt trees, particularly smooth-barked species with long ribbons of decorticating bark. In south-east Queensland, where this bird is at its northern limits (Blakers, Davies and Reilly 1984), it has a scattered distribution within upland wet sclerophyll forests and rainforests with emergent eucalypts. It is threatened by clearing, wildfire, and the logging and thinning of forests (Loyn 1985; Kutt, 1996).

The red-browed treecreeper was recorded on seven sites at two survey areas, both within its known range. It was detected during standard bird transects and opportunistically, in tall open forest with or without a rainforest sub-canopy and in rainforest with emergent eucalypts. (Figure 4.3.15)

4.3.16 *Dasyornis brachypterus* eastern bristlebird

Eastern bristlebirds are small omnivores, whose distribution is restricted to three disjunct areas between eastern Victoria and south-east Queensland. The population centres are located in northern NSW and south-east Queensland; the Illawarra Basin; and East Gippsland. Populations within these areas are small and often widely separated from each other. The majority of the northern population occurs within the SEQ bioregion, where they are known from the McPherson, Main and Conondale ranges (Holmes 1989).

Individuals of the northern populations differ in their habitat requirements from those further south. Optimum habitat within south-east Queensland appears to be open eucalypt forest with a grassy understorey (Hartley and Kikkawa 1994). Eastern bristlebirds have also been located in high altitude heath within Mt Barney NP (Holmes 1989). The northern populations occur adjacent to areas of rainforest, which the birds use as a refuge from fire. Populations within the bioregion are small, all containing less than 12 animals (D. Stewart pers. comm.). Twenty-one animals are currently known from the state. The populations within the bioregion are threatened by inappropriate fire regimes, grazing, disturbance by pigs, and predation by pest species (Hartley and Kikkawa 1994)

The eastern bristlebird is a cryptic species, and is largely ground-dwelling. It flies only short distances and keeps low to the ground. They are most easily detected by their loud distinctive calls and are known to respond to call playback. The eastern bristlebird was not recorded during the CRA surveys, even though surveys were conducted at the Main and Conondale ranges, near known populations. The lack of records reflects the rarity of the species and also its extremely restricted distribution. The species requires intensive targeted surveys using call playback methods to ensure detection. (Figure 4.3.16).

4.3.17 *Lichenostomus melanops* yellow-tufted honeyeater

The yellow-tufted honeyeater is a relatively large, gregarious, nectar dependent honeyeater which occurs sparsely throughout its range, from from Naracoorte, South Australia, to the SEQ bioregion (Blakers, Davies and Reilly 1984). Its preferred habitat is dense undergrowth, usually associated with creeklines and gullies within more open woodland and forest (Chrome 1988). These honeyeaters often live in discrete colonies of 10-100 individuals, within which small family groups maintain territories of up to ten hectares (Blakers, Davies and Reilly 1984). The species may roam more widely outside the breeding season (Crome 1988).

Yellow-tufted honeyeaters are large, bold and curious, and are unlikely to be overlooked in a standard survey. During the CRA surveys, yellow-tufted honeyeaters were recorded at 12 standard sites and incidentally at another 24 sites. These sightings occurred in state forests scattered throughout the SEQ bioregion. All records were within the expected distribution and habitat of the species. A range of densities, between one and 22 individuals per hectare, was recorded for this species during the standard bird surveys, although most records were of less than ten individuals. Given the total survey effort, yellow-tufted honeyeaters appear to be uncommon and localised. (Figure 4.3.17).

4.3.18 *Melithreptus gularis* black-chinned honeyeater

There are at least two subspecies of the black-chinned honeyeater. *Melithreptus gularis gularis,* the golden backed form, occurs in eastern Australia, while *M. g. laetior* is distributed across the northern half of the continent (Blakers, Davies and Reilly 1984). Like other *Melithreptus* honeyeaters, black-chinned honeyeaters consume more insects and manna than nectar, typically through gleaning the undersides of branches and twigs. Such a diet lessens their dependence on the flowering of eucalypts and probably allows them to be more sedentary than many other honeyeaters (B. Trail pers. comm.). Abbott (1987) comments that *M. gularis* are the most sedentary of the *Melithreptus,* but that the size of their home range is so large that at small scales they can appear nomadic. Barry Trail (pers. comm.) considers the species to be mostly restricted to larger forest blocks and to be present at very low densities (0.1 birds/ 10 ha). For much of their range black-chinned honeyeaters live as pairs or small colonies, often breeding communally (Abbott 1988; Pizzey and Knight 1997).

During the CRA surveys, black-chinned honeyeaters were found on 13 standard sites in four survey

areas and were recorded incidentally at another ten sites. They were most abundant in Wongi and Cordalba state forests and less so at Cherbourg SF. The species appears to be uncommon and localised within the SEQ bioregion. (Figure 4.3.18).

4.3.19 *Xanthomyza phrygia* regent honeyeater

The regent honeyeater inhabits woodland and open forest on the eastern and western flanks of the Great Dividing Range, from southern Queensland to southern Victoria (Stewart 1988; Blakers, Davies and Reilly 1984). Throughout its range, this species has suffered population declines and experienced a contraction of its range. In Queensland, it once occurred as far north as Byfield and the Dawson River (Blakers, Davies and Reilly 1984). However the regent honeyeater is now limited to southern Queensland, with most records from the Nandawar and the New England Tableland bioregions. Few recent records occur from within the SEQ bioregion, with no known breeding records. There are a small number of recent breeding records from the Stanthorpe-Inglewood area (R. Johnson pers. comm.)

The lack or sightings in the CRA surveys reflects the rarity of regent honeyeaters and their marginal distribution within the SEQ bioregion. (Figure 4.3.19).

4.3.20 *Poephila cincta cincta* black-throated finch (white-rumped form)

The black-throated finch feeds on seeds in dense grasses beneath open woodlands. Historically, this species was found in all but the south-western parts of Queensland. Within this distribution, three separate races are known: the northern two races, *P. c. nigrotecta* and *P. c. atropygialis,* range over Cape York to just south of Cairns. The third subspecies, *P. c. cincta,* was once distributed from the south of Cairns to just over the New South Wales border, and well inland. This range has contracted northwards to within a few hundred kilometres of its northern boundary (Blakers, Davies and Reilly 1984). A small, outlying population remains on the New England Tableland in northern New South Wales (Pizzey and Knight 1997). The causes of the black-throated finch's decline are unknown, but probably relate to grazing pressure on its habitat. Blakers, Davies and Reilly (1984) provides only a few historical records for within the SEQ bioregion.

Black-throated finches move in flocks of up to 20 individuals in open habitats and are unlikely to have been missed, but no sightings of the black-throated finch were made during the CRA surveys. This in part reflects their rarity in the bioregion. However, many of the survey areas were in unsuitable habitat for this predominantly open woodland species.

FIGURES 4.3.1 TO 4.3.19 PRIORITY BIRD DISTRIBUTIONS THROUGHOUT SEQ BIOREGION AND BLACKDOWN TABLELAND

Fig 4.3.2

fig 4.3.3

fig 4.3.4

fig 4.3.5

fig 4.3.6

fig 4.3.7

fig 4.3.8

fig 4.3.9

fig 4.3.10

fig 4.3.11

fig 4.3.12

fig 4.3.13

fig 4.3.14

fig 4.3.15

fig 4.3.16

fig 4.3.17

fig 4.3.18

fig 4.3.19

4.4 MAMMALS

4.4.1 *Ornithorhynchus anatinus* platypus

Ornithorhynchus anatinus is an aquatic and oviparous mammal, whose distribution extends from coastal far north Queensland to south-eastern Australia including Tasmania (Carrick 1995). Its habitat is permanent streams and watercourses, where it forages for benthic fauna, including insects, molluscs and worms. Males and females occupy overlapping home ranges, varying from three to seven kilometres long in the case of males (Gardner and Serena 1995). Activity patterns are crepuscular, and during the day it occupies burrows in the stream banks. *Ornithorhynchus anatinus* seem to be able to tolerate a degree of disturbance, but threatening processes include impoundment of streams, reduced water quality and the effects of grazing (Gilmore and Parnaby 1994; Carrick 1995).

The species was detected only twice during the CRA surveys: dusk and dawn sightings from opportunistic sites at Mt Mee SF and Blackdown Tableland NP respectively. The lack of records across all survey areas cannot be regarded as indicative of its current distribution in south-east Queensland, as limited survey effort occurred in its preferred habitat. Targeted surveys (using fyke nets, etc.) in suitable habitat are required to adequately survey this species. (Figure 4.4.1).

4.4.2 *Antechinus swainsonii* dusky antechinus

Antechinus swainsonii is a small, ground dwelling species, with a distribution that extends from Tasmania, north along the Australian east coast, to the Queensland and New South Wales border area (Dickman 1995). Within its range, *A. swainsonii* inhabits heath, and tall open forest with a dense understorey of fern and shrub. The species is also known from rainforest communities in south-east Queensland (Van Dyck and Ogilvie 1977). It feeds on soil invertebrates and small fruits (Dickman 1995), and is threatened by processes that remove dense ground cover, such as controlled burning, and the creation of pine plantations (Lunney, Cullis and Eby 1987; Dickman 1995). In the SEQ bioregion, the only known location of the species is Lamington NP, where it occurs at elevations above 800 m (G. Krieger pers. comm.).

This species was not detected from any of the three CRA survey areas (Main Range NP, Numinbah SF, and Goomburra SF) that occur within its potential range, which is probably a reflection of the lack of sampling carried out in elevated areas.

4.4.3 *Dasyurus hallucatus* northern quoll

Dasyurus hallucatus occurs across northern Australia from the Pilbara region of Western Australia to south-east Queensland (Braithwaite and Begg 1995). Historical records of this species indicate that its distribution within the SEQ bioregion extends from Kroombit Tops in the north to the Main Range in the south (Watt 1993). It is found in broken rocky country and eucalypt woodland, within 150 km of the coast. The smallest of all the quolls, it is both arboreal and terrestrial, but can range over large areas, up to 1000 ha for some individuals (King 1989). The diet of *D. hallucatus* consists of small mammals, insects, small reptiles and birds (Braithwaite and Begg 1995). The species has declined considerably since European settlement (Braithwaite and Begg 1995), and current threats include the impacts of the introduced cane toad (*Bufo marinus*) (Burnett 1997).

Despite the use of hair tubes at all systematic CRA survey sites throughout the region, only one record of a *Dasyurus* species was recorded, from Many Peaks TR. This record could not be positively identified to species level (B. Triggs pers. comm.). Previous studies targeting this species have also resulted in low detection rates; for example, Watt (1993) obtained only eight quoll records from 3200 hair tube days in southern Queensland. Difficulties with detection methods,

scattered distribution and low population densities within the region, create problems in determining true population estimates. (Figure 4.4.2).

4.4.4 *Dasyurus maculatus maculatus* spotted-tailed quoll (southern subspecies)

Dasyurus maculatus maculatus is the largest extant marsupial carnivore on the Australian mainland (Edgar and Belcher 1995), with a distribution ranging across eastern Australia from Victoria to south-east Queensland. A separate subspecies, *D. m. gracilis* also occurs in northern Queensland. The species has declined in Victoria (Mansergh 1983) and in south-east New South Wales (Catling and Burt 1994) and is no longer found in South Australia (Aitken 1983). Within the bioregion, the species has declined in the last 20 years, and is no longer found in the greater Brisbane area (Watt 1993; Van Dyck 1995b). Remaining populations occur at the Blackall/Conondale Ranges, Main Range, Lamington Plateau and the McPherson and Border Ranges, and are probably fragmented (Watt 1993). The absence of recent records from the coastal plains suggests that habitat loss and modification has contributed substantially to the decline of populations in these areas (Watt 1993). *Dasyurus m. maculatus* is an opportunistic predator, with a diet including small to medium sized mammals, birds, reptiles, insects and carrion (Ride, 1970). It is an inhabitant of rainforests and dense woodlands where it nests in hollow logs, trees, caves and rock crevices (Watt 1993).

During the CRA surveys, only one record of a *Dasyurus* species was obtained, from a hair tube sample collected from the Many Peaks TR. However, the sample was not sufficient to determine the species (B. Triggs, pers comm). Hair-tubes were employed in many areas of suitable habitat, and their lack of success in determining quoll presence was comparable to the results of Catling, Burt and Kooyman (1997). These researchers also employed meat-baited traps with limited success. The lack of quoll records during the CRA surveys is also a reflection of their patchy distribution and low population densities in the region. (Figure 4.4.3).

4.4.5 *Phascogale tapoatafa* brush-tailed phascogale

Phascogale tapoatafa is an arboreal, carnivorous marsupial that is sparsely distributed throughout dry sclerophyll forests and woodlands, to wet sclerophyll forests of Australia. The range of the subspecies, *P. t. tapoatafa*, is from Victoria north along the coastal ranges to about Gympie, with isolated records from Rockhampton (Ingram and Raven, 1991). *Phascogale tapoatafa* are entirely nocturnal, and are dependent on mature trees for nest hollows, and for their main food source of bark-associated invertebrates (Rhind 1996). As such, forest management practices such as clearfelling, selective logging, and burning are considered to be threatening processes.

This species was recorded at four CRA standard sites, all within the one survey area, Benarkin SF. Here, an adult female with pouched young was caught in an Elliott trap at one site in araucarian notophyll vine forest - a vegetation type not normally associated with phascogales. At another three vine forest sites, the species was detected using hair-tubes. However, these records do not necessarily represent three different individuals, as both sexes are known to maintain large territories. For example, males forage over areas greater than 100 ha, and travel even greater distances during the winter breeding season (Soderquist 1995). Since the brush-tailed phascogale is largely arboreal, the lack of records from hair-tubes (and Elliott traps) at other survey areas is not surprising. Arboreal placement of traps may have targeted this species more effectively, but it is generally regarded as a difficult animal to survey (Traill and Coates 1993). There was also one incidental sighting of an individual during a vehicle spotlight of open, dry sclerophyll woodland at Benarkin SF. The overall paucity of records during the CRA surveys is probably a reflection of the cryptic nature of the species, as well as its patchy distribution, and low density throughout the region. (Figure 4.4.4).

4.4.6 Phascolarctos cinereus koala

Phascolarctos cinereus is an arboreal folivore, restricted in its distribution to the eucalypt forests and woodlands of eastern Australia. In the SEQ bioregion, high population densities of this species occur in fragmented areas of remnant vegetation within the Brisbane, Redlands and Ipswich city council boundaries. Food trees preferred in this area include blue gum (*E. tereticornis*), grey gum (*E. propinqua*), tallowwood (*E. microcorys*) and flooded Gum (*E. grandis*) (Martin and Handasyde 1995). The populations with the highest densities tend to occur in eucalypt communities growing on higher-nutrient soils. However, *P. cinereus* also occur in forest growing on poorer coastal soils (Martin and Handasyde 1995). *Phascolarctos cinereus* is solitary, and individuals have distinct home ranges which vary according to population density and the abundance of mature food trees (Martin and Handasyde 1995). Major threats to the species, particularly in the lowland areas, are land clearing, traffic, and predation from domestic dogs (Van Dyck, 1995b).

During the CRA surveys, *P. cinereus* was recorded at 34 sites and five incidental locations, in 21 survey areas across the bioregion, and within a range of eucalypt forest types. The species was recorded at more sites within Grongah, Kandanga and Cherbourg state forests in the central part of the SEQ bioregion than at any other CRA survey areas. Records were obtained during spotlighting sessions, as well as opportunistically on and off site during the day. The species was also readily detectable from scats, and from the male's loud vocalisations, which can be heard from up to 800 m away (Martin and Handasyde 1995). (Figure 4.4.5).

4.4.7 *Cercartetus nanus* eastern pygmy-possum

Cercartetus nanus has a distribution which extends across south-eastern Australia, from Tasmania north to the Border Ranges of Queensland and New South Wales (Turner and Ward 1995). The southern border of the SEQ bioregion forms the northern limits of the species' range. The species is generally nocturnal and mainly arboreal, although it has been caught in pitfall and Elliott traps indicating that it comes to the ground at times (Turner and Ward 1995). It feeds mainly on nectar, pollen and invertebrates and is found in a range of habitats including rainforest, sclerophyll forest and tree heath (Turner and Ward 1995).

Within the bioregion, *C. nanus* is restricted to areas of high elevation (above 800 m) of Lamington and Mt Barney national parks. The species was not detected during the CRA surveys, despite survey effort in potential habitat at Goomburra SF and Emu Vale SF in the Main Range area. However, the surveys were undertaken during August and October respectively, when the species' activity is limited, with much time is spent in torpor (Geiser 1993). (Figure 4.4.6).

4.4.8 *Petaurus australis australis* yellow-bellied glider

Petaurus australis is a large, active and vocal petaurid, that inhabits eucalypt forest and woodlands in eastern Australia (Russell 1995). The southern subspecies, *P. a. australis* occurs from Victoria to the central coast of Queensland, near Mackay (Russell 1995). Whilst the species has an extensive distribution, it occurs at low densities, with small family groups maintaining exclusive home ranges of approximately 30-65 ha (Craig 1985; Goldingay and Kavanagh 1991). The species has a varied diet consisting mainly of plant and insect exudates (sap, nectar, honeydew and manna), supplemented by pollen and bark-associated invertebrates (Goldingay 1990). The availability of each component of the diet can vary seasonally, and as such, particular combinations and assemblages of tree species are critical determinants of this glider's distribution (Goldingay 1986; Kavanagh 1987). Mature and old growth forests also provide tree hollows as nesting sites, which can be reduced in logging events. Logging is considered to be the principal threatening process throughout the range of the species (Goldingay and Kavanagh 1991).

Whilst *P. australis* are somewhat difficult to observe, they are easily detected from their loud and distinctive calls, that can be heard from up to 400 m away (Biggins 1984). The species also

responds readily to playback of recorded forest owl calls (eg. Davey 1990) - a technique used in the CRA surveys. *Petaurus australis* were recorded from 104 sites, across 28 survey areas, usually during standard spotlighting or call playback sessions. Incidental records provided another 48 locations at 17 of the 28 survey areas. These incidental records were mostly a result of hearing gliders calling, or identifying the distinctive V-shaped feeding marks on the trunks of their feed trees. During the surveys *P. australis* tended to be associated with gum-barked and winter flowering eucalypt species (eg. *Corymbia citriodora*, *Eucalyptus tereticornis*, *E. moluccana*), concurring with the results of Eyre and Smith (1997). (Figure 4.4.7).

4.4.9 *Petaurus norfolcensis* squirrel glider

These medium-sized gliders are agile arboreal creatures that can glide up to 50 m (Suckling 1995). *Petaurus norfolcensis* inhabits dry sclerophyll forests and woodlands in eastern Australia, from western Victoria to Charters Towers in Queensland. Its range extends into coastal and even moist forests in south-east Queensland and north-eastern New South Wales (Suckling 1995). *Petaurus norfolcensis* lives in family groups, with individual home ranges of between 2.5 and 4 ha (Quinn 1995). Activity is principally nocturnal, with individuals foraging widely for eucalypt sap, nectar, insect exudates, pollen and bark-associated invertebrates (Menkorst and Collier 1988). The species is dependent on hollow-bearing trees for nest sites, and as such, threatening processes include clearing, and unsympathetic forest management practices. The species may be endangered in the southern parts of its range, and south-east Queensland appears to be an important refuge (Quinn 1995).

Petaurus norfolcensis is regarded as the most difficult of the petaurids to survey, as their eyes reflect poorly, they rarely call, and they tend to forage in the upper part of the canopy (Davey 1984; Menkhorst, Weavers and Alexander 1988; Davey 1990). As a consequence, their presence in the region was probably underestimated during the CRA surveys. The species was detected from 35 sites at 18 survey areas throughout the bioregion, particularly in the central and northern parts. Most individuals were detected on standard sites, either by spotlighting or call recognition. One individual was captured in a standard line of Elliott traps, in dry open forest - an unusual method of detection for these principally arboreal animals. All individuals were found in typical habitat; open forests and woodlands which had mature or mixed-age stands, often with winter flowering or gum-barked species. (Figure 4.4.8).

4.4.10 Petauroides volans greater glider

The largest of the gliding marsupials, *Petauroides volans* is an ecological specialist, having an almost exclusive diet of eucalypt leaves (Hume, Foley and Chilcott 1984). Ranging from Victoria to the Barron River in north Queensland, this species inhabits a variety of vegetation types, from mixed coastal forests, to tall forests, to the low woodlands west of the Dividing Range (McKay 1995). Two subspecies are recognised, but only the southern subspecies *P. volans volans* occurs in south-east Queensland. *Petauroides volans* is nocturnal and essentially solitary, having small home ranges of approximately 1.5 ha. Within these home ranges, individuals have numerous den trees, but only a few are used regularly (Kehl and Borsboom 1984). Because *P. volans* is dependent on mature forest with tree hollows, it is threatened by clearing and selective logging (McKay 1995).

The species was recorded during hand-held spotlight surveys from a total of 56 sites across 20 survey areas. They were also encountered incidentally at 27 locations within nine of the 20 survey areas. Incidental sightings were frequently during vehicle spotlighting - a method found to be very successful for this species (Davey 1990). The records were widely distributed across the bioregion, although no gliders were detected from the most coastal forests, eg. Eurimbula NP, Watalgan SF or the Cooloola area of Great Sandy NP. (Figure 4.4.9).

4.4.11 *Pseudocheirus peregrinus* common ringtail possum

Pseudocheirus peregrinus inhabits coastal bushland to moist forests along the east coast of mainland Australia and Tasmania (McKay and Ong 1995). Four subspecies are currently recognised, with *P. peregrinus peregrinus* and *P. p. pulcher* occupying the northern and southern parts of SEQ bioregion respectively. Unlike many other species of possum and gliders, *P. peregrinus* are not restricted to forests that provide tree hollows, due to its ability to construct nests or dreys. However, both sexes will utilise tree hollows for nesting if they are available. Several nest sites are in use at any one time, with individuals occupying home ranges of approximately 2.5 ha (Augee *et al.* 1996). Threatening processes for this species relate to habitat destruction, and the effects of introduced species such as foxes and cats (McKay and Ong 1995).

The species is considered to be relatively difficult to survey, since the dense foliage of their preferred habitat may obscure detection or identification (Barry 1984; Davey 1984). Throughout the CRA survey areas, *P. peregrinus* were found inhabiting a variety of vegetation types, from eucalypt forest to vine forest and rainforest, but each was characterised by the presence of dense foliage or a complex midstorey. The species was recorded at 24 sites and two incidental locations, across 14 survey areas throughout the bioregion. The species was generally detected during spotlighting of standard sites, however several individuals were detected from calls, and the sole record from Eurimbula NP was from remains (a skull and other bones). (Figure 4.4.10).

4.4.12 *Aepyprymnus rufescens* rufous bettong

Aepyprymnus rufescens is the largest of the potoroids (Dennis and Johnson, 1995). It also has the largest extant distribution of all the bettongs, ranging from far north Queensland to northern New South Wales. Within this area, it is usually found from coastal regions to slightly west of the divide, in habitats ranging from tall wet sclerophyll, to low open woodland (Dennis and Johnson, 1995). Both males and females maintain large home ranges; 75-110 ha and 45-60 ha respectively, and individuals may travel up to 4.5 km in a normal night's foraging (Dennis and Johnson 1995). *Aepyprymnus rufescens* appears to be secure in the region (Dennis and Johnson 1995), but threats to this species include changing fire regimes, over-grazing, urban encroachment and predation from cats, dogs, and foxes (Schlager 1981; Van Dyck 1995b).

The species appears to be widespread in the SEQ bioregion, and during the CRA surveys it was recorded at 23 sites from 17 survey areas, from Watalgan SF in the north, to Emu Vale SF near the New South Wales border. It was generally found in open dry sclerophyll forest with a grassy understorey; typical habitat for this species. The species was rarely detected during standard spotlighting transects, and was usually encountered opportunistically on-site during the day, resting in grass nests. Hair-tubes detected this species from two sites at Mt Mee SF, and one site at Littabella NP. *Aepyprymnus rufescens* was also recorded incidentally from a further nine locations across the survey areas. (Figure 4.4.11).

4.4.13 *Potorous tridactylus* long-nosed potoroo

The known range of *Potorous tridactylus* extends across south-east Australia, from south-west Victoria, and reaches its northern limits of its distribution at Bulburin SF in south-east Queensland. In addition, a small population isolate has recently been discovered in south-west Western Australia (Johnston 1995). The species is found in wet and dry sclerophyll forests with an annual rainfall exceeding 760 mm and requires a dense understorey of grass and shrubs for shelter (Johnston 1995). This nocturnal species prefers forests on lighter soils, where it digs for the fungi, roots, tubers, and invertebrates that comprise its diet (Seebeck, Bennet and Scotts 1989; Claridge, Cunningham and Tanton 1993). It is threatened by clearing, unplanned fire, grazing and competition with introduced herbivores (Jarman and Johnston 1977).

During the CRA surveys, *P. tridactylus* was recorded on three sites at two survey areas; in wet

sclerophyll forest at Bellthorpe SF; and in dry sclerophyll forest with a healthy understorey at Mt Mee SF. Although *P. tridactylus* is cryptic and rarely seen, the lack of records obtained during the surveys indicate that the species is genuinely scarce in the region. (Figure 4.4.12).

4.4.14 *Macropus agilis* agile wallaby

This medium sized macropod occurs in coastal areas of tropical Australia, but within the SEQ bioregion, *Macropus agilis* is found on North and South Stradbroke and Peel islands (Van Dyke 1995b). Isolated records have also been obtained from the southern Moreton Bay area (Woogoompah Island) and from the adjacent mainland near Ormeau (I. Gynther pers. comm.). This species is abundant north of Rockhampton where its preferred habitats is along rivers and streams in open forest close to grasslands (Merchant 1995). In the bioregion, the diet is a variety of grasses, forbs and sedges, and *M. agilis* also forages on coastal dune spinifexes (Ramsey and Wilson 1997). Its habits are gregarious; living in groups of up to ten, and even greater numbers aggregating in feeding areas (Merchant 1995).

Macropus agilis was not detected during the CRA surveys, since none of the areas within their known south-east Queensland range were assessed. (Figure 4.4.13).

4.4.15 *Macropus dorsalis* black-striped wallaby

A habitat specialist, *Macropus dorsalis* has a range extending from northern New South Wales, to around Townsville in the north, but a restricted distribution within the region (Kirkpatrick 1995). The species shelters in the dense cover of closed forests or other suitably thick vegetation during the day, feeding in adjacent open grassy areas at night. Home ranges are large, approximately 91 ha (Evans 1996), but *M. dorsalis* is rarely seen more than a few hundred metres from dense cover. The species has declined in much of its range, possibly due to habitat loss and disturbance as a result of forest clearing for pastures and cropping, and predation by foxes (Gilmore and Parnaby 1994).

Macropus dorsalis was recorded at 14 sites in nine survey locations during the CRA surveys. Most observations were made in or near vine forest or similar dense vegetation, and usually only 1-2 individuals were observed on any site. Although the species prefers dense habitat, the survey results probably reflect the species' relative scarcity and narrow habitat preference, rather than detectability. (Figure 4.4.14).

4.4.16 *Petrogale herberti* Herbert's rock-wallaby

Petrogale herberti has a restricted distribution within the SEQ bioregion, being found from Nanango, northward to the south bank of the Fitzroy River at Rockhampton (Eldridge and Close 1995). Like *P. penicillata*, this species is often found in association with rugged terrain, favouring hilly areas where suitable rocky outcrops or boulder fields occur (Clancy and Close 1997). In the northern portion of the region, the species utilises dry rainforest communities and drier open forests adjacent to rocky outcrops. In the southern portion of its range, *P. herberti* contacts *P. penicillata* and a narrow hybrid zone is formed (Eldridge and Close 1995). This hybrid zone is currently under pressure from mining and urban developments, but in suitable habitat elsewhere the region in the species is considered to be common (Clancy and Close 1997).

This species was recorded at four CRA survey areas in the northern part of the bioregion, including Many Peaks TR, Bulburin SF, Kroombit Tops SF and Blackdown Tableland NP. At Many Peaks TR, the species was detected via identification of scats, which is considered to be a reliable method of detecting rock-wallaby presence (Jarman and Capararo 1997). At all other CRA sites the species was encountered during opportunistic diurnal searches of suitable habitat. (Figure 4.4.15).

4.4.17 *Petrogale penicillata* brush-tailed rock-wallaby

Petrogale penicillata reaches the northern limits of its known range within the southern portion of the SEQ bioregion. It extends into New South Wales and is marginal in Victoria (Jarman and Bayne 1997). It is found in suitable rocky areas either on scree or cliff lines, in a range of vegetation types, including rainforest gullies, wet and dry sclerophyll forest, and open woodland. Diet consists mainly of grasses and forbs as well as seeds, fruit and flowers which are eaten opportunistically (Short 1989). *Petrogale penicillata* exhibits high site fidelity, spending the day in habitually used refuges and travelling at night to forage within a limited distance of the refuges (Jarman and Bayne 1997). This extreme site fidelity makes them vulnerable to predators that may locate a colony (Jarman and Bayne 1997).

Prior to 1915, *P. penicillata* was relatively abundant and widespread in New South Wales and northern Victoria (Short and Milkouits 1990), but has since declined significantly due to competition from introduced herbivores such as rabbits and goats and predation from foxes (Eldridge and Close 1995). Within the SEQ bioregion, significant populations exist within Boonah Shire in the Moogerah Peaks and Main Range National Parks, but they are nevertheless considered to be vulnerable to extinction (Clancy and Close 1997).

During the CRA surveys, *P. penicillata* was recorded at three sites and one incidental location, in two survey areas: Emu Vale SF (near Main Range NP) and Deongwar SF. In both these areas individuals were recorded in habitats of open forest adjacent to dry rainforest communities. The Deongwar site was close to permanent water. The small number of records obtained during the CRA surveys reflects the limited number of surveys carried out in their preferred habitat. The detection of rock-wallabies requires specialised survey methodology that targets typical refuge areas such as rocky outcrops or scree slopes. (Figure 4.4.16).

4.4.18 *Thylogale stigmatica* red-legged pademelon

The known range of *Thylogale stigmatica* extends along the east coast of Australia from New South Wales through to north Queensland. However, the distribution of this species is discontinuous, which largely reflects its dependence on dense vegetation for shelter (Johnson and Vernes 1995). In south-east Queensland, this small macropod is largely confined to the interior of vine forests and rainforests. Home-ranges are relatively small, around 2.5 ha (Vernes, Marsh and Winter 1995), and the diet is composed of leaves, fruit, ferns, native grasses and fungi (Vernes 1995).

The red-legged pademelon was recorded only twice during the survey: a freshly-dead juvenile recovered from a standard site at Yarraman SF; and an animal seen to cross a road at Mt Mothar SF. However, the paucity of records may not accurately reflect the abundance of the species - it is a particularly difficult animal to see in its preferred habitat. (Figure 4.4.17).

4.4.19 *Nyctimene robinsoni* eastern tube-nosed bat

Nyctimene robinsoni is a poorly known species which is associated with lowland rainforest (Gilmore and Parnaby 1994; Richards 1995). Very little is known of its roosting ecology, however in north Queensland, it was found to roost solitarily or in small groups in canopy foliage of the rainforest, feeding on rainforest fruits at night (Gilmore and Parnaby 1994). Being an inhabitant of rainforest, the status of *N. robinsoni* is threatened by clearance and fragmentation of lowland rainforest areas in south-eastern Queensland.

Nyctimene robinsoni is readily detected by its characteristic audible call, although Hall, Richards and Spencer (1995) suggests that this appears to be seasonal in nature (ie. summer) and may be restricted to males. This species was detected at seven sites in five CRA survey areas, all of which were in rainforest. Detection was either by harp trapping or by hearing audible calls. (Figure 4.4.18).

4.4.20 *Pteropus alecto* black flying-fox

Pteropus alecto is distributed widely around the northern Australian coastline extending from northern Western Australia, the northern half of the Northern Territory, Queensland and north-eastern NSW (Gilmore and Parnaby 1994). It roosts communally in camps of up to several thousand individuals, often in association with other *Pteropus* species, and their preferred roost sites are generally in mangroves and paperbark swamps, and occasionally in rainforest patches (Hall 1995a). The species feeds largely on the blossom of eucalypts and paperbarks in natural circumstances, but are often forced to raid domestic and agricultural fruit crops in areas where their natural habitat is greatly reduced. Threats facing *P. alecto* includes disturbance at camps, clearing and development of its feeding habitat.

While the megabats were not specifically targeted during the CRA surveys by field survey methods, they are readily detectable by their loud calls and can be easily observed feeding on blossom or fruit. However only one individual was recorded at an opportunistic site in coastal heathland at Littabella NP. (Figure 4.4.19).

4.4.21 *Pteropus poliocephalus* grey-headed flying-fox

The largest of the flying-foxes, *Pteropus poliocephalus* ranges from about Townsville in the tropical north, south along the east coast, and into southern Victoria (Tideman 1995a). *Pteropus poliocephalus* roosts communally, often in hundreds of thousands, in gullies with dense vegetation canopy, and feeds on rainforest fruits, blossom from eucalypts, angophoras, banksias and tea-trees (Tideman 1995a).

During the CRA surveys, *P. poliocephalus* was detected at 20 sites in six survey areas, plus two incidental sightings. Almost all sightings in dry sclerophyll forests with flowering *Corymbia citriodora*. Observations of *P. poliocephalus* were usually of single or small groups feeding on eucalypt blossom although larger groups varying between 20 and 30 individuals were encountered. No searches were made of potential or known camps, and presence was generally only detected on an opportunistic basis when animals were seen or heard feeding. As with other species of flying foxes in the bioregion, *P. poliocephalus* is threatened by destruction of camp areas, clearing and development of feeding habitat. (Figure 4.4.20).

4.4.22 *Pteropus scapulatus* little red flying-fox

Pteropus scapulatus is the most widespread if the *Pteropus* species in Australia, ranging from the dry inland to the coast in eastern Australia and the Northern Territory, and along the northern coast of Western Australia (McCoy 1995). *Pteropus scapulatus* eats predominantly eucalypt blossom, often migrating great distances to follow seasonal flowering episodes. The species roosts diurnally in tall vegetation, forming large groups of up to 1000 000 individuals in some cases (McCoy 1995). Roost sites are often shared with other, more sedentary *Pteropus* species.

Pteropus scapulatus was recorded at eight sites in seven CRA survey areas. Observations were at two standard CRA sites, five opportunistic sites, and one incidental sighting. Sightings were generally of only one or two individuals although at Blackdown Tableland, a group of approximately 20 individuals were recorded feeding on a Blackdown stringybark *Eucalyptus sphaerocarpa*. Most observations were from either dry sclerophyll forest or vine forest. (Figure 4.4.21).

4.4.23 *Syconycteris australis* common blossom-bat

Syconycteris australis is a specialised nectar-feeding bat which in southern Queensland, feeds almost exclusively on nectar from melaleuca, banksia, callistemon and some eucalyptus species

(Law and Spencer 1995). In subtropical areas, it is thought to roost in subcanopy layers within lowland rainforest patches adjacent to heathlands which provide those food resources (Law and Spencer 1995). It occurs throughout the coastal areas from Cape York Peninsula to mid eastern New South Wales (Hall and Richards 1979; Law and Spencer 1995). The major threats to the conservation status of this species are disturbance and destruction of habitat (eg. clearing of rainforest patches and development of heathlands).

CRA surveys in the SEQ bioregion recorded *S. australis* from 11 sites in five survey areas. Although normally regarded as an inhabitant of coastal or near coastal forests, captures from two inland sites (Kroombit Tops SF and Bulburin SF - the furthest approximately 75km from the coast), represents new distributional information for this species within the bioregion. (Figure 4.4.22)

4.4.24 *Hipposideros semoni* Semon's leafnosed-bat

Little is known about the distribution, habitat preferences and biology of *Hipposideros semoni*. Individuals have been recorded roosting in caves, mines and rock fissures (Hall 1995c; de Oliveira and Schulz 1996). It has also been encountered roosting in a variety of other situations including tree hollows, deserted buildings, the door handle of a car, a clothes closet, an oven and a picture rail (Hall 1995c). No maternity colonies have been located. This species occurs from Cape York Peninsula south to Townsville, with an isolated record from a cave in Kroombit Tops SF, west of Gladstone (Schulz and de Oliveira 1995). Habitat ranges from vine thicket to open eucalypt woodland (Hall 1995c, de Oliveira and Schulz 1996). Ultrasonic calls from an unidentified bat recorded from St. Marys SF, south west of Maryborough, were suspected to be from this species (de Oliveira and Pavey 1995). However, an intensive trapping effort failed to capture the bat. Calls subsequently recorded from known *H. semoni* (de Oliveira and Schulz 1996) suggest the St Marys bat to be different and its identity remains problematic (M. de Oliveira pers. comm.).

This species was not recorded during the CRA surveys. Much greater search effort (eg. extensive cave searches) needs to be conducted to determine its distribution in south-east Queensland, particularly in the Kroombit Tops - Blackdown Tablelands area. Given the scarcity of information on the species, little is known about threats facing this bat in the region. (Figure 4.4.23).

4.4.25 *Taphozous georgianus* common sheathtail-bat

Taphozous georgianus is among the largest of the insectivorous bats occurring throughout northern Australia and reaches its southern distributional limits in the extreme north of the SEQ bioregion (Jolly 1995). It is an obligate cave-dweller, commonly found in overhangs, rock crevices, and near the entrance to deeper caves and mineshafts (Jolly 1995).

Taphozous georgianus was recorded at only two sites within one survey area, Blackdown Tableland. Individuals were found by searching caves and rock overhangs. Unconfirmed ultrasonic calls of *Taphozous* spp. were recorded at Kroombit Tops SF, Many Peaks TR, Warro SF and Glenbar SF. Further survey effort is required to confirm the presence of *T. georgianus* at Glenbar SF, which would constitute a significant southern range extension. The recordings from Warro SF may represent *T. australis* (M. de Oliveira pers. comm.). However, due to difficulties associated with separating *Taphozous* calls ultrasonically, the presence of *T. australis* in the SEQ bioregion remains unconfirmed. (Figure 4.4.24).

4.4.26 *Mormopterus norfolkensis* eastern freetail-bat

The uncertainty surrounding the taxonomy and field identification of *Mormopterus* species in south-eastern Australia has resulted in problems regarding the validity of recent literature records of the species (Parnaby 1998). The known range of the species extends from central New South Wales along the coast and Great Dividing Range to south-east Queensland (Allison and Hoye

1995). In New South Wales, *M. norfolkensis* has been recorded in dry and wet sclerophyll forests and woodlands, with one record from rainforest (Parnaby 1998). Nothing is known about the roosting or feeding requirements of this species.

In the SEQ bioregion, little is known of the distribution or habitat preferences of *M. norfolkensis*. Many records attributed to this species in the past may be doubtful, given the difficulty in separating *M. norfolkensis* from the *M. planiceps* complex and *Mormopterus* sp.1 in the hand (Parnaby 1992; 1995; 1998). Due to the identification problems of *Mormopterus* in the field, individuals were not identified to species level during the CRA surveys. Specimens were collected and are currently being analysed electrophoretically by T. Reardon of the South Australian Museum.

Fortunately, the ultrasonic call of *M. norfolkensis* is distinctive (M. de Oliveira, unpubl. records). However no calls of the species were detected during the CRA survey ANABAT sessions. (Figure 4.4.25).

4.4.27 *Chalinolobus dwyeri* large-eared pied bat

Few *Chalinolobus dwyeri* records exist throughout its range from southern New South Wales to central eastern Queensland (Hoye and Dwyer 1995). The majority of records are from the drier forest types, including subalpine woodland. In north-eastern New South Wales the majority of records are from dry sclerophyll forest adjacent to rainforest or wet sclerophyll forest with a rainforest sub-canopy (Parnaby 1986; NSW NPWS 1994; M.Schulz unpubl. records). Little is known about the roosting requirements of *C. dwyeri*, though it has been recorded utilising disused mine tunnels, caves, rock overhangs and abandoned fairy martin (*Hirundo ariel)* nests (Hoye and Dwyer 1995; Schulz 1998).

Chalinolobus dwyeri was not recorded during the CRA surveys. The only records of this species within the SEQ bioregion are from open forests at Lamington NP (I. Gynther and G. Ford unpubl. records), Gambubal SF (I. Gynther unpubl. records), forest adjacent to the Mount Mistake section of Main Range NP (M. Schulz unpubl. records), and individuals found roosting in disused fairy martin nests in the Wivenhoe Dam and Lake Moogerah areas (Schulz 1998).

Despite having a distinctive echolocation call (Parnaby 1998), no calls of *C. dwyeri* were recorded during the CRA surveys. Targeted survey work is required in the bioregion to determine the distribution, habitat preference and roosting requirements of the species. (Figure 4.4.26).

4.4.28 *Chalinolobus picatus* little pied bat

Chalinolobus picatus is described as an arid to semi-arid adapted species (Ayers 1995) extending from the mallee region in South Australia (Reardon and Flavel 1987) into the dry areas of western New South Wales and southern Queensland to just north of the Tropic of Capricorn (Hall and Richards 1979; Richards 1995). It occurs in a wide range of vegetation communities including mallee, brigalow, bimble box, eucalypt woodlands and open forests. In the past the species was regarded as either a cave, mine or rock shelter roosting species (Hall and Richards 1979; Richards 1995). However, recent observations indicate that *C. picatus* also utilises tree hollows as roosts (Tidemann 1988; Schulz, de Oliveira and Eyre 1994). Prior to the CRA surveys, the distribution of *C. picatus* in the SEQ bioregion was known from only three localities, including a single record from Lockyer SF (S. Debus unpubl. records), four individuals recorded from Cordalba SF (DNR unpubl. records), and a single individual recorded from Eurimbula NP (M. Schulz unpubl. records).

The CRA surveys recorded *C. picatus* at ten sites across eight survey areas - seven of which are new locations for this species in south-east Queensland. All records were obtained from harp traps, and most were from dry forests dominated by *Corymbia citriodora* and ironbark species. In both

Cordalba and Benarkin state forests, individuals were recorded from auracarian notophyll vine forest gullies; a vegetation type not normally associated with this species. One individual *C. picatus* recorded from mixed coastal lowland forest at Bingera SF near Bundaberg represents a previously undocumented habitat type for the species. (Figure 4.4.27).

4.4.29 *Falsistrellus tasmaniensis* eastern false pipistrelle

Falsistrellus tasmaniensis has a widespread distribution from Tasmania, through southern Victoria and eastern New South Wales, and reaches the northern limit of its geographic range in south-east Queensland (Phillips 1995). The species appears to have a Bassian distribution, being restricted to cooler high elevation forests in the northern parts of its range. *Falsistrellus tasmaniensis* primarily roost in the tree hollows, with a maximum colony of 91 males recorded (Phillips *et al.* 1985; Parnaby 1998).

No records of the species were collected during the CRA surveys. Within the SEQ bioregion *F. tasmaniensis* is only known from Lamington in the south (I. Gynther unpubl. records) with an isolated record from the Bunya Mountains (B. Thompson unpubl. records). This species is locally common on the New South Wales side of the border in the Brindle Creek and Levers Plateau areas (M. Schulz unpubl. records). There have been difficulties associated with the identification of ultrasonic calls from the species, due to the incorrect identification of the original voucher call (L. Lumsden pers. comm.). Targeted survey work is required in the bioregion to determine the distribution, habitat preferences and roosting requirements of the species. (Figure 4.4.28).

4.4.30 *Kerivoula papuensis* golden-tipped bat

Kerivoula papuensis has been recorded at a scattering of localities, from Mumbla SF in south-east New South Wales, north along the eastern seaboard to Cape York Peninsula (Woodside, 1995). It appears to have a localised distribution. The overall paucity of records for this species, may in part be a reflection of the difficulty of capturing this species using standard trapping techniques and ultrasonically detecting the species with commonly used bat detector systems (Schulz 1995a). *Kerivoula papuensis* has been recorded from sea level to over 1200 m in altitude (Parnaby and Mills 1994; M. Schulz unpubl. records). Only single individuals have been recorded in the majority of known localities. This species has been recorded from a variety of rainforest types, ranging from tropical mesophyll vine forest to semi-evergreen vine thickets, and tall eucalypt open forest with a rainforest subcanopy. A small number of records are from dry and wet sclerophyll forests lacking a rainforest subcanopy, riparian *Casuarina cunninghamiana* dominated forest, coastal *Melaleuca* forests and several individuals have been recorded inside houses on the edge of residential areas (M. Schulz unpubl. records).

Kerivoula papuensis has been found roosting in disused, suspended nests of the yellow-throated scrubwren (*Sericornis citreogularis*) and to a lesser extent the brown gerygone (*Gerygone mouki*) (Schulz 1995b; Schulz in prep.). One individual was located roosting in a hollow of a rainforest subcanopy tree at Kroombit Tops (Schulz and de Oliveira 1995). A maternity site was utilised in two successive years in a hollow of a rainforest canopy tree in the Richmond Range NP (Schulz, in prep.). Outside Australia, this species has been recorded in caves and in buildings (Flannery 1995a, b).

The CRA surveys located this species from five new forest areas: the Cooloola area of Great Sandy NP, Wrattens, Oakview, Mt Mee and Squirrel Creek state forests. Multiple individuals were only caught in three sites (three individuals in the Beech Scientific Area of Kroombit Tops SF and two individuals each at sites in Oakview SF and at Squirrel Creek SF). This species was only captured in more than single sites in Kroombit Tops and Squirrel Creek state forests. All localities for this species fell within the predicted distribution identified in Parnaby and Mills (1994). All individuals were captured in closed forest ranging from complex notophyll vine forest to araucarian notophyll-

microphyll vine forest. The short, quiet echolocation call at a very high frequency of this species resulted in no individuals being located ultrasonically. (Figure 4.4.29).

4.4.31 *Miniopterus australis* little bentwing-bat

The distribution of *Miniopterus australis* extends along eastern Queensland from Cape York to central New South Wales (Dwyer 1995). Though recent evidence indicates that *M. australis* may roost in tree hollows (Schulz 1997), the species is known to predominantly roost in caves, usually near dense vegetation types such as rainforest, wet sclerophyll forest and coastal banksia heath (Dwyer 1968; Gilmore and Parnaby 1994). The species is highly mobile, with movements of up to 32 kilometres recorded (Gilmore and Parnaby 1994). *Miniopterus australis* requires substantial numbers within maternity colonies to increase the ambient roost temperature (Dwyer 1968). No maternity roosts are known within the SEQ bioregion, other than a large roost in a natural cave in Tarong NP, which may be a maternity colony (B. Thompson unpubl. records).

During the CRA surveys, *M. australis* was one of the more commonly recorded microbat species (92 sites across 36 survey areas), from harp trapping and ultrasonic detection. It was recorded in a range of vegetation types, including open eucalypt forest, vine scrub and rainforest. (Figure 4.4.30).

4.4.32 *Miniopterus schreibersii* common bentwing-bat

Miniopterus schreibersii has a widespread distribution throughout eastern Australia, from south-east South Australia through to the Northern Territory and northern Western Australia. The species has a complex pattern of roost utilisation which varies in response to climatic conditions, seasons, reproductive cycles and social organisation (Dwyer 1963). Banding studies have documented extensive movements of individuals between roost sites in several regions of New South Wales and Victoria, with one individual recorded moving 1300 km (Dwyer and Hamilton-Smith 1965, Dwyer 1969). *Miniopterus schreibersii* has been recorded in a diverse range of habitats ranging from rainforest, wet and dry sclerophyll forest, woodlands, heath, and grasslands (Dwyer 1995; Parnaby 1998). Within the bioregion, roost sites have been poorly documented, with no maternity colonies known (L. Hall pers. comm.).

Miniopterus schreibersii, although widely distributed throughout the SEQ bioregion, was less frequently recorded than *M. australis* during the CRA surveys. The species was recorded from harp traps and ultrasonic detection at 27 sites across 17 survey areas, in open dry forests to rainforests. (Figure 4.4.31).

4.4.33 *Myotis* sp. large-footed myotis

A recent review of the large-footed myotis documented a single species, *Myotis moluccarum*, occurring within Queensland (Kitchener, Cooper and Maryanto 1995). However, the collection of genetic samples from a number of locations throughout the SEQ bioregion indicate two species, *M. moluccarum* and *M. macrorus*, may both be present with overlapping ranges within the region (T. Reardon, pers. comm.). Currently, these species appear indistinguishable based on external morphology and ultrasonic calls (Parnaby 1998; M. Schulz unpubl. records). Consequently, all *Myotis* records in the bioregion should be denoted as *Myotis* sp. until the taxonomic and field identification problems have been clarified.

Myotis is unique in Australia, in that it is the only bat that uses its large feet and long curved claws to rake the surface of waterbodies for aquatic insects and small fish (Dwyer 1970; Jansen 1987; Robson 1984). This bat is regarded as being confined to waterbodies (Lumsden and Menkhorst 1995), although recently roosts have been located well over 1 km from the nearest waterbody (Schulz 1998). Roost sites include caves, disused mines, tunnels, under bridges, tree hollows, road

culverts and disused fairy martin (*Hirundo ariel*) nests (Lumsden and Menkhorst 1995; Schulz 1998). *Myotis* has also been recorded from tidal channels and mangrove wetlands in the Pumicestone Passage (Schulz 1994b).

Although *Myotis* is widespread throughout the SEQ bioregion in non-forest areas (Schulz 1998), few records were obtained during the CRA surveys. The species was recorded from five sites across five survey areas, and the paucity of records reflects the concentration of survey effort in forested rather than aquatic habitats. (Figure 4.4.32).

4.4.34 *Scotorepens sanborni* northern broad-nosed bat

The known distribution of *Scotorepens sanborni* is considered to extend throughout the tropical regions of North Queensland as far south as the Rockhampton district (Hall 1995b). Little is known about the biology or habitat preferences of the species, though it has been recorded roosting in tree hollows (Hall 1995b). There is currently some uncertainty regarding the taxonomic status of *Scotorepens* species, and valid identification of individuals to species level (either morphologically or by ultrasonic call) is problematic (H. Parnaby pers. comm.; M. Schulz unpubl. records).

Based on existing records, *S. sanborni* has not been recorded in the SEQ bioregion (Ingram and Raven 1991; Hall 1995b). Due to difficulties in identification, small *Scotorepens* (other than *S. balstoni* and *S. orion*) captured during the CRA surveys were not identified to species level. Specimens were collected and are currently being analysed electrophoretically by T. Reardon of the South Australian Museum. A number of small *Scotorepens* captured in harp traps at three sites in the dry open forests at Blackdown Tableland may be *S. sanborni*, but have been recorded as *Scotorepens* sp. in Figure 4.4.33.

4.4.35 *Scotorepens* sp. (Parnaby 1992) unidentified broad-nosed bat

As with *Scotorepens sanborni*, the confusion surrounding the taxonomy and field identification (including ultrasonic call identification) of broad-nosed bats (*Scotorepens* spp) has resulted in considerable uncertainty about the validity of records attributed to this species or the closely related *S. greyii* (Parnaby 1995). This bat occurs from coastal central New South Wales north to south-east Queensland, although currently it is not known how far north its range extends (Parnaby pers. comm.). In New South Wales this species has only been recorded from coastal and subcoastal forests, mainly in drier forest types (NSW NPWS 1994). Nothing is known of its roosting or feeding requirements.

Currently, based on existing records in south-east Queensland, little is known about its distribution or habitat preferences. Many records attributed to this species must be considered doubtful, given the documented difficulty in separating this bat in the hand or ultrasonically from *S. greyii* and possibly *S. sanborni* (Parnaby 1992; 1995). Due to the difficulty of identifying *Scotorepens* species, no species names were attributed to individual bats captured in the CRA survey (with the exception of *S. balstoni* and *S. orion*). Unidentified broad-nosed bats were recorded from 28 sites across 14 survey areas throughout the bioregion. Selected individuals were collected and are currently being identified electrophoretically by T. Reardon of the South Australian Museum. Since this species has been identified as a nationally threatened species (Richards and Hall 1997), field identification difficulties urgently need to be resolved and targeted surveys undertaken to identify the distribution, habitat preferences and threats facing the species in the SEQ bioregion. (Figure 4.4.33).

4.4.36 *Vespadelus darlingtoni* large forest bat

Vespadelus darlingtoni reaches its northern limit at the New South Wales/ Queensland border. It roosts predominantly in tree hollows, although it has also been located roosting under loose bark

and in artificial structures (Hoye 1995; Lumsden and Bennett 1995). In the southern part of its range this species ranges from sea level to an altitude of approximately 1300 m and occurs in a wide variety of vegetation types including wet and dry sclerophyll forest and rainforest. In Victoria, its inland limit of distribution corresponds approximately to the 500 mm isohyet (Lumsden and Bennett 1995). In the SEQ bioregion it appears restricted to high altitude tall open forest and rainforest above 300 m in the extreme south such as at McPherson Range and Main Range. Since nothing is known of the biology of this species at the northern extremity of its range; little can be said of threats facing this species.

In the CRA surveys, *V. darlingtoni* was recorded from six sites in three survey areas. In these localities it appeared to be common, frequently dominating captures in harp traps (eg., Goomburra SF). An isolated record was obtained from Squirrel Creek SF in dry forest dominated by *Eucalyptus tereticornis*. This species is abundant in adjacent areas of the granite belt, such as Girraween NP (M. Schulz unpubl. records). (Figure 4.4.34).

4.4.37 *Vespadelus regulus* southern forest bat

There is considerable confusion in separating this species from other *Vespadelus* spp. (Parnaby 1992). It appears that a number of records from northern New South Wales, particularly from coastal sites, may have been the result of miss-identifications (H. Parnaby and D. Mills pers. comm.). Identification is further confused by a smaller, paler variant which may possibly be a separate cryptic species (Parnaby 1995). This pale variant has been variously confused with *V. vulturnus* and *V. darlingtoni*. In the northern part of its range this species appears confined to various forest types in high to mid-altitude areas.

This species was not recorded in the bioregion during the CRA surveys. There does not appear to be any previously documented records from the region (Ingram and Raven 1991), even though distribution maps in mammal texts frequently extend it into the bioregion (Parnaby 1992; Tideman 1995c). The nearest documented records of the species is from Boonoo Boonoo NP (NSW CRA Fauna Surveys). The pale variant has been recorded from Eena SF (north-west of Inglewood); south-west of the bioregion (Forest Wildlife Section, DNR unpubl. records). Targeted surveys in high altitude sections of the McPherson and Main Range areas and possibly the Bunya Mountains need to be undertaken to determine whether this bat is present in the bioregion.

4.4.38 *Vespadelus troughtoni* eastern cave bat

Vespadelus troughtoni was first recognised as a distinct species in 1987 (Kitchener, Jones and Caputi 1987). Very little is known about the distribution, habitat preferences and biology of this species (Parnaby 1998). Within its range it appears extremely localised, with for example, very few records obtained in northern New South Wales during recent intensive bat surveys. This bat is commonly regarded as a cave roosting species (Parnaby 1995). However, recent studies have shown this bat to commonly use cracks and crevices in bridges and culverts, abandoned fairy martin (*Hirundo ariel*) nests and inside buildings (Schulz 1998; M. Schulz pers. comm.). A number of roosts located by Schulz (1998) were situated many kilometres from the nearest rock outcrops or known caves, suggesting this species to be more widely distributed than previously thought.

This bat has a widespread, but localised distribution in south-east Queensland. In the CRA surveys, *V. troughtoni* was recorded from nine sites in three survey areas in the northern part of the region such as Blackdown Tableland, Kroombit Tops, and Warro SF. This species is common in overhangs in Kroombit Tops (Schulz and de Oliveira 1994) although during surveys, capture rates in harp traps were relatively low. This species does not appear to be readily detected by conventional techniques. For example, at Brooyar SF, no individuals were trapped or ultrasonically detected; while two individuals were located in roosting in disused Fairy Martin nests. Apart from

human disturbance at roosts, nothing is known about threats facing this bat in the bioregion. (Figure 4.4.35).

4.4.39 *Vespadelus vulturnus* little forest bat

Vespadelus vulturnus is typically depicted as only extending as far as northern south-east Queensland (Tidemann 1995b). However, recent records have been obtained from a number of localities in inland southern Queensland to as far north as Duaringa (Forest Wildlife Section, DNR unpubl. records; Schulz, de Oliveira and Eyre 1994) and into south western Queensland such as Idalia NP (Young and Ford in press). Within its range in inland southern Queensland, it appears to be common, frequently comprising over 50 % of bats captured in harp traps or by triplining (eg. Barakula SF, Forest Wildlife Section, DNR unpubl. records). Care is required to separate this species from the pale variant of *V. regulus* (Parnaby 1995).

Although there has been a degree of taxonomic certainty associated with the *Vespadelus* species since the review of Kitchener, Jones and Caputi (1987), recent findings suggest that there may yet be one or more hitherto undescribed species in the SEQ bioregion (B. Thomson pers. comm.). If this is the case, then it is possible that some confusion still exists over the identity and distribution of some *Vespadelus* species discussed above. As a group, some generalisations may be made about their conservation status and associated threats. With the exception of *V. troughtoni*, all are thought to be tree-hollow-roosting bats, so the primary threat to their status comes from inappropriate management of hollow-bearing forest areas. The Response to Disturbance project (DNR, DoE and EA 1998) identified threats such as logging, clearing and fire for all species in the genus. Predation by feral cats and foxes may also be a significant threatening factor.

This species was not identified during any of the CRA surveys. (Figure 4.4.36).

4.4.40 *Pseudomys novaehollandiae* New Holland mouse

This little known ground dwelling mammal once thought to be extinct was rediscovered in 1967 at Ku-ring-gai Chase National Park in New South Wales (Kemper 1995). Since then records indicate that its distribution ranges from Tasmania along the east coast of mainland Australia to south-east Queensland. *Pseudomys novaehollandiae* is known from three locations in the SEQ bioregion, two from animals caught using Elliott traps at Crows Nest and at Glenrock, south of Gatton (Van Dyck and Lawrie 1997). The third record was obtained from bone material collected from an area known as “Big Rooster” which is also south of Gatton. The habitat preference in the region appears to be limited to tall dry open forest communities with an understorey of heath dominated by *Xanthorrhoea* species. Elsewhere within its range in Australia this species is found in coastal heath as well as elevated areas such as Barrington Tops, New South Wales (Kemper 1995). Because of its broader habitat preferences in the northern extent of its distribution, Van Dyck and Lawrie (1997), have suggested that it could occur in coastal areas of Queensland particularly North and South Stradbroke islands, Moreton Island and the Great Sandy Region. Threatening processes for this species include competition with introduced house mice (*Mus musculus*), land clearing, changing fire regimes and predation by cats (Wilson 1991; Kemper 1995; Quinn and Williamson 1996).

The CRA surveys did not detect this species at any sites, despite Elliott and pit-fall trapping in areas with potentially suitable habitat, eg. the Cooloola area of Great Sandy NP, Bingera SF, and Littabella NP. Factors that may have affected the detection of this species in the past are its very limited distribution, low abundance and possibility of misidentification. (Figure 4.4.37).

4.4.41 *Pseudomys oralis* Hastings River mouse

Pseudomys oralis is known from north-east New South Wales along the Great Dividing Range to the Main Range and McPherson Range area of south-east Queensland. Within the bioregion, it is restricted to elevated areas above 500 m in Gambubal SF (Poole 1994) and from five sites within the western sector of Lamington NP (Gynther and O'Reilly 1995; I. Gynther pers. comm.). Earlier historical records exist in the form of bones which were collected in 1976 from owl pellets from near Mapleton in the Blackall Ranges, but there are no recent records from this location. This small rodent has a diet of leaves, seeds and insects (Fox *et al.* 1994), and occurs in open forests with a well developed layer of shrubs, herbs, sedges and ferns as well as sites with a more open understorey. Until recently the presence of this species was thought to be associated with either permanent water or stands of sedges. Some of the recently recorded Lamington sites has neither of these characteristics, which has led researchers to broaden their search effort to other potential habitats within the region (Gynther and O'Reilly 1995).

This species was not detected during the CRA surveys, despite Elliott and pitfall trapping being undertaken at three survey areas with potentially suitable habitat: Main Range NP, Goomburra SF and Mapleton SF. The lack of records appears to indicate that they are genuinely rare in the region. (Figure 4.4.38).

4.4.42 *Pseudomys patrius* eastern pebble-mound mouse

Pseudomys patrius was recently rediscovered in 1991 after not being seen since 1907, when six specimens were collected from Mt Inkerman, near Ayr in central Queensland (Van Dyck 1996a). It is now known to occur on the Great Dividing Range and associated ranges from northern Queensland southwards to near Kilkivan in south-east Queensland (Van Dyck 1996a). It is found in dry open forests and woodlands on shallow to skeletal soils with abundant rock and a supply of regular-sized pebbles. Grass seeds, other plant material and insects are known to be eaten by this rodent. It may be threatened by overgrazing, fire, clearing, weed invasion and selective logging (Van Dyck 1996a).

Pseudomys patrius was recorded on 13 standard sites at eight CRA survey areas. These records were primarily of animals caught in Elliott traps (11 records), with another animal pit-trapped and a single record of a burrow-mound only. The survey areas were all on elevated areas and on a diversity of geologies. The records served to fill gaps in the known range of the species between Springsure and Kilkivan, and extended it eastward in the SEQ bioregion to the Gin Gin area (Warro SF). (Figure 4.4.39).

4.4.43 *Xeromys myoides* false water-rat

The distribution of *Xeromys myoides* is poorly known. This species appears to be restricted to coastal northern Australia, with isolated records occurring from the Western Australia/Northern Territory border, to the Coomera River in south-east Queensland (Van Dyck 1995a). *Xeromys myoides* has been collected from a variety of coastal habitats, including mangrove forests, freshwater lagoons, and sedged lakes close to foredunes and swamps (Van Dyck 1995a). It is a nocturnal, ground-dwelling animal, and whilst it is associated with water and is an adept swimmer, it does not appear to be truly aquatic (Van Dyck 1995a).

Xeromys myoides nests in either large termitarium-like mounds, or in simple tunnels in the supralittoral bank (eg. Magnussen, Webb and Taylor 1976; Van Dyck 1996b). Van Dyck (1996b) found that individuals nocturnally left their communal nests to follow the receding tide through sedgelands to mangroves, where they foraged over home ranges of approximately 0.8 ha for males and 0.6 ha for females. The diet consists of crustaceans, bivalves and other invertebrates (Van Dyck 1996b).

This species has been detected by capturing animals in Elliott traps, from its distinctive nest structures, and also from remains in crocodile stomachs (Magnussen, Webb and Taylor 1976, Van Dyck 1996b). Targeted methods are required to adequately survey *X. myoides*, including searching for nests and trapping within suitable habitat. Targeted trapping only occurred once during the CRA surveys, at Tin Can Bay Inlet on the edge of the Cooloola section of the Great Sandy NP. Here, one adult female was captured in an Elliott trap baited with pilchards, placed amongst the mangroves bordering the inlet. At other survey areas with potential habitat for *X. myoides* (namely Bingera SF, Littabella NP and Eurimbula NP) these targeted methods were not employed, due to a lack of surplus Elliott traps. (Figure 4.4.40).

FIGURES 4.4.1 TO 4.4.40 PRIORITY MAMMAL DISTRIBUTIONS THROUGHOUT SEQ BIOREGION AND BLACKDOWN TABLELAND

Fig 4.4.2

fig 4.4.3

fig 4.4.4

fig 4.4.5

fig 4.4.6

fig 4.4.7

fig 4.4.8

fig 4.4.9

fig 4.4.10

fig 4.4.11

fig 4.4.12

fig 4.4.13

fig 4.4.14

fig 4.4.15

fig 4.4.16

fig 4.4.17

fig 4.4.18

fig 4.4.19

fig 4.4.20

fig 4.4.21

fig 4.4.22

fig 4.4.23

fig 4.4.24

fig 4.4.25

fig 4.4.26

fig 4.4.27

fig 4.4.28

fig 4.4.29

fig 4.4.30

fig 4.4.31

fig 4.4.32

fig 4.4.33

fig 4.4.34

fig 4.4.35

fig 4.4.36

fig 4.4.37

fig 4.4.38

fig 4.4.39

fig 4.4.40

APPENDICES

Appendix 1 Summary of vertebrate species recorded during the SEQ CRA Fauna Survey project and method of detection

Genus species	Common name	No. of std survey records system sites	No. of incid records system sites	**Total records system sites**	No. of std survey records on opp sites	No. of incid. records	**Total no. of records**	Diurn herp srch	Noct herp srch	pitfall	Elliot trap	Hair-tube	Scat srch	Early bird	Late bird	call play-back	Spot-light	Harp -trap	Bat ultra-sonic	Trip-lining	Mist-net	Cave mine srch	Turt trap	Opp bat ultra-sonic
		STD	*ION*	***Total***	*STD*	*INC*	***Total***	*SHD*	*SHN*	*SPT*	*SET*	*SHA*	*SSS*	*SBE*	*SBL*	*SPB*	*SSP*	*STH*	*SUH*	*CTT*	*CTM*	*CAC*	*CTU*	*OUH*
Amphibians																								
Adelotus brevis	tusked frog	8	3	**11**	9	4	**25**	4	13	2						2	1							
Assa darlingtoni	Australian marsupial frog	1	0	**1**	0	0	**1**	1	1															
Crinia parinsignifera	beeping froglet	3	3	**6**	7	5	**18**	2	8															
Crinia signifera	clicking froglet	8	2	**10**	2	12	**24**	6	5	2						2	1							
Crinia tinnula	wallum froglet	1	0	**1**	1	1	**3**		2															
Kyarranus kundagungan	red-and-yellow mountain-frog	1	0	**1**	0	1	**2**	1	1								1							
Lechriodus fletcheri	black-soled frog	0	0	**0**	0	4	**4**																	
Limnodynastes dumerilii	grey-bellied pobblebonk	3	0	**3**	0	1	**4**	1	3								1							
Limnodynastes ornatus	ornate burrowing-frog	9	3	**12**	2	10	**24**	2	3	8							3							
Limnodynastes peronii	striped marshfrog	8	8	**16**	3	22	**41**	2	5	4						1	3							
Limnodynastes tasmaniensis	spotted marshfrog	0	1	**1**	0	4	**5**									1	2							
Limnodynastes terraereginae	scarlet-sided pobblebonk	16	6	**22**	1	23	**46**	3	8	7	1					1								
Mixophyes fasciolatus	great barred-frog	13	4	**17**	3	16	**36**	1	13	4						4	6							
Mixophyes fleayi	Fleay's barred-frog	1	0	**1**	0	4	**5**		1								1							
Pseudophryne coriacea	red-backed broodfrog	2	1	**3**	0	1	**4**	1	1								2							
Pseudophryne major	great brown broodfrog	15	7	**22**	3	13	**38**	3	13	3						5	6							
Pseudophryne raveni	copper-backed broodfrog	18	3	**21**	5	20	**46**	6	15	3						3	6							
Uperoleia fusca	sandy gungan	4	0	**4**	1	8	**13**	2		3														

Appendix 1 continued

Genus species	Common name	No. of std survey records system sites	No. of incid records system sites	**Total records system sites**	No. of std survey records on opp sites	No. of incid. records	**Total no. of records**	Diurn herp srch	Noct herp srch	pitfall	Elliot trap	Hair-tube	Scat srch	Early bird	Late bird	call play-back	Spot-light	Harp -trap	Bat ultra-sonic	Trip-lining	Mist-net	Cave mine srch	Turt trap	Opp bat ultra-sonic
		STD	*ION*	***Total***	*STD*	*INC*	***Total***	*SHD*	*SHN*	*SPT*	*SET*	*SHA*	*SSS*	*SBE*	*SBL*	*SPB*	*SSP*	*STH*	*SUH*	*CTT*	*CTM*	*CAC*	*CTU*	*OUH*
Uperoleia laevigata	eastern gungan	3	0	**3**	2	1	**6**		4	2														
Cyclorana alboguttata	green-stripe frog	0	0	**0**	0	1	**1**																	
Litoria brevipalmata	green-thighed frog	2	0	**2**	0	5	**7**		1	1														
Litoria caerulea	green treefrog	5	5	**10**	2	19	**31**	2	5	1							2							
Litoria chloris	southern orange-eyed treefrog	1	0	**1**	2	2	**5**		3							1	1							
Litoria dentata	bleating treefrog	1	2	**3**	0	5	**8**		1															
Litoria fallax	eastern sedgefrog	9	8	**17**	6	33	**56**	8	8							2	2							
Litoria freycineti	wallum rocketfrog	1	0	**1**	1	0	**2**		2															
Litoria gracilenta	graceful treefrog	9	3	**12**	2	14	**28**	2	10							7	4							
Litoria inermis	bumpy rocketfrog	0	1	**1**	0	2	**3**																	
Litoria latopalmata	broad-palmed rocketfrog	8	7	**15**	5	34	**54**	2	11							1	3							
Litoria lesueuri	stony-creek frog	13	3	**16**	6	18	**40**	9	12															
Litoria nasuta	striped rocketfrog	5	0	**5**	0	5	**10**	3	2															
Litoria olongburensis	wallum sedgefrog	1		**1**	2	0	**3**		3															
Litoria pearsoniana	cascade treefrog	4	4	**8**	1	4	**13**	1	4								2							
Litoria sp. cf. barringtonensis	no common name	1		**1**	2		**3**		3								2							
Litoria peronii	emerald-spotted treefrog	3	1	**4**	2	18	**24**	1	4							2	1							
Litoria rothii	red-eyed treefrog					1	**1**																	
Litoria rubella	naked treefrog	10	12	**22**	2	13	**37**	6	8							2	1							
Litoria tyleri	laughing treefrog	1		**1**		2	**3**		1															
Litoria verreauxii	whistling treefrog	3	2	**5**		5	**10**	3								1	2							
Bufo marinus	cane toad	85	23	**108**	25	49	**182**	64	58	15	3					3	13							

Appendix 1 continued

Genus species	Common name	No. of std survey records system sites	No. of incid records system sites	**Total records system sites**	No. of std survey records on opp sites	No. of incid. records	**Total no. of records**	Diurn herp srch	Noct herp srch	pitfall	Elliot trap	Hair-tube	Scat srch	Early bird	Late bird	call play-back	Spot-light	Harp -trap	Bat ultra-sonic	Trip-lining	Mist-net	Cave mine srch	Turt trap	Opp bat ultra-sonic
		STD	*ION*	***Total***	*STD*	*INC*	***Total***	*SHD*	*SHN*	*SPT*	*SET*	*SHA*	*SSS*	*SBE*	*SBL*	*SPB*	*SSP*	*STH*	*SUH*	*CTT*	*CTM*	*CAC*	*CTU*	*OUH*
Reptiles																								
Elseya latisternum	saw-shelled turtle	0	1	**1**	2	0	**3**	1															1	
Diplodactylus vittatus	wood gecko	20	3	**23**	2	2	**27**	5	14	4							1							
Gehyra dubia	no common name	24	6	**30**	5	10	**45**	17	14								1							
Heteronotia binoei	Bynoe's gecko	31	2	**33**	21	12	**66**	36	23	2														
Nephrurus asper	spiny knob-tailed gecko	1	0	**1**	0	1	**2**		1															
Nephrurus milii	thick-tailed gecko	2	0	**2**	4	2	**8**	3	3															
Oedura rhombifer	zigzag gecko	20	1	**21**	2	6	**29**	17	11															
Oedura robusta	robust velvet gecko	4	4	**8**	4	4	**16**	4	4								1							
Oedura tryoni	southern spotted velvet gecko	34	13	**47**	14	16	**77**	31	26	1							2							
Phyllurus caudiannulatus	no common name	1	0	**1**	0	1	**2**	1																
Saltuarius salebrosus	leaf-tailed gecko	1	0	**1**	6	3	**10**	2	5															
Delma plebeia	common delma	0	1	**1**	0	0	**1**																	
Delma tincta	northern delma	0	0	**0**	1	0	**1**	1																
Delma torquata	collared delma	2	0	**2**	0	1	**3**	1		1														
Lialis burtonis	Burton's legless lizard	3	2	**5**	0	0	**5**	2		1														
Paradelma orientalis	brigalow scaly-foot	1	0	**1**	0	0	**1**	1																
Pygopus lepidopodus	common scaly-foot	0	1	**1**	0	1	**2**																	
Amphibolurus nobbi	nobbi	9	1	**10**	5	5	**20**	13		2														
Chlamydosaurus kingii	frilled lizard	0	1	**1**	0	3	**4**																	
Diporiphora australis	tommy roundhead	8	12	**20**	1	5	**26**	8		1														

Appendix 1 continued

Genus species	Common name	No. of std survey records system sites	No. of incid records system sites	**Total records system sites**	No. of std survey records on opp sites	No. of incid. records	**Total no. of records**	Diurn herp srch	Noct herp srch	pitfall	Elliot trap	Hair-tube	Scat srch	Early bird	Late bird	call play-back	Spot-light	Harp -trap	Bat ultra-sonic	Trip-lining	Mist-net	Cave mine srch	Turt trap	Opp bat ultra-sonic
		STD	*ION*	***Total***	*STD*	*INC*	***Total***	*SHD*	*SHN*	*SPT*	*SET*	*SHA*	*SSS*	*SBE*	*SBL*	*SPB*	*SSP*	*STH*	*SUH*	*CTT*	*CTM*	*CAC*	*CTU*	*OUH*
Hypsilurus spinipes	southern angle-headed dragon	0	0	**0**	0	2	**2**																	
Physignathus lesueurii	eastern water dragon	4	6	**10**	2	16	**28**	5	1															
Pogona barbata	bearded dragon	1	2	**3**	0	14	**17**		1															
Varanus gouldii	sand monitor	1	5	**6**	0	5	**11**	1																
Varanus tristis	no common name	2	0	**2**	2	2	**6**	2	1	1	1													
Varanus varius	lace monitor	6	22	**28**	2	34	**64**	7	1															
Anomalopus leuckartii	no common name	2	0	**2**	2	0	**4**	4																
Anomalopus verreauxi	Verreaux's skink	16	4	**20**	9	8	**37**	22	3	2														
Calyptotis lepidorostrum	no common name	9	2	**11**	3	2	**16**	9	3	2														
Calyptotis scutirostrum	no common name	30	1	**31**	6	5	**42**	32	9	5														
Calyptotis temporalis	no common name	4	0	**4**	0	1	**5**	4	1															
Carlia munda	no common name	0	2	**2**	0	0	**2**																	
Carlia pectoralis	no common name	78	21	**99**	13	28	**140**	83	6	15	1	1												
Carlia schmeltzii	no common name	8	4	**12**	1	5	**18**	7	1	1														
Carlia vivax	lively skink	23	9	**32**	4	11	**47**	23		5														
Coeranoscincus reticulatus	three-toed snake-tooth skink	2	0	**2**	1	1	**4**	3																
Cryptoblepharus virgatus	wall skink	91	12	**103**	9	25	**137**	95	18	5														
Ctenotus arcanus	no common name	9	0	**9**	9	3	**21**	15	3	2	1													
Ctenotus robustus	eastern striped skink	2	6	**8**	1	4	**13**	3																
Ctenotus taeniolatus	copper-tailed skink	26	8	**34**	8	18	**60**	29	5	4														
Cyclodomorphus gerrardii	pink-tongued lizard	3	1	**4**	0	1	**5**	1	2								1							

Appendix 1 continued

Genus species	Common name	No. of std survey records system sites	No. of incid records system sites	**Total records system sites**	No. of std survey records on opp sites	No. of incid. records	**Total no. of records**	Diurn herp srch	Noct herp srch	pitfall	Elliot trap	Hair-tube	Scat srch	Early bird	Late bird	call play-back	Spot-light	Harp -trap	Bat ultra-sonic	Trip-lining	Mist-net	Cave mine srch	Turt trap	Opp bat ultra-sonic
		STD	*ION*	***Total***	*STD*	*INC*	***Total***	*SHD*	*SHN*	*SPT*	*SET*	*SHA*	*SSS*	*SBE*	*SBL*	*SPB*	*SSP*	*STH*	*SUH*	*CTT*	*CTM*	*CAC*	*CTU*	*OUH*
Egernia cunninghami	Cunningham's skink	1	1	**2**	0	0	**2**	1			1													
Egernia frerei	major skink	0	1	**1**	0	0	**1**				1													
Egernia major	land mullet	0	3	**3**	0	0	**3**																	
Egernia striolata	tree skink	0	2	**2**	1	1	**4**	1																
Eroticoscincus graciloides	elf skink	5	1	**6**	1	1	**8**	6	2	1														
Eulamprus brachysoma	no common name	2	0	**2**	1	2	**5**	1		2														
Eulamprus martini	no common name	27	12	**39**	9	11	**59**	30	8	1														
Eulamprus murrayi	no common name	1	1	**2**	0	0	**2**	1			1													
Eulamprus quoyii	eastern water skink	4	1	**5**	3	8	**16**	6	1															
Eulamprus sokosoma	no common name	3	2	**5**	1	2	**8**	4																
Eulamprus tenuis	no common name	9	4	**13**	5	1	**19**	13	2	1								1						
Glaphyromorphus punctulatus	no common name	5	0	**5**	0	1	**6**	4	1															
Lampropholis adonis	no common name	18	6	**24**	1	3	**28**	17	3															
Lampropholis amicula	friendly skink	34	7	**41**	5	6	**52**	25	1	14		1												
Lampropholis couperi	no common name	1	3	**4**	1	3	**8**	2																
Lampropholis delicata	eastern grass skink	42	8	**50**	4	7	**61**	37	1	13														
Lampropholis guichenoti	no common name	3	1	**4**	0	0	**4**	1		2														
Lerista fragilis	no common name	23	2	**25**	5	5	**35**	24	5	2														
Lygisaurus foliorum	no common name	72	11	**83**	9	19	**111**	69	12	15														
Lygisaurus timlowi	no common name	3	0	**3**	0	3	**6**	2		1														
Morethia taeniopleura	fire-tailed skink	20	10	**30**	5	7	**42**	22	2	6														

Appendix 1 continued

Genus species	Common name	No. of std survey records system sites	No. of incid records system sites	**Total records system sites**	No. of std survey records on opp sites	No. of incid. records	**Total no. of records**	Diurn herp srch	Noct herp srch	pitfall	Elliot trap	Hair-tube	Scat srch	Early bird	Late bird	call play-back	Spot-light	Harp -trap	Bat ultra-sonic	Trip-lining	Mist-net	Cave mine srch	Turt trap	Opp bat ultra-sonic
		STD	*ION*	***Total***	*STD*	*INC*	***Total***	*SHD*	*SHN*	*SPT*	*SET*	*SHA*	*SSS*	*SBE*	*SBL*	*SPB*	*SSP*	*STH*	*SUH*	*CTT*	*CTM*	*CAC*	*CTU*	*OUH*
Nangura spinosa	Nangur skink	1	0	**1**	0	0	**1**	1																
Ophioscincus cooloolensis	no common name	2	0	**2**	0	0	**2**			2														
Ophioscincus ophioscincus	no common name	8	0	**8**	0	0	**8**	6	2															
Saiphos equalis	no common name	1	0	**1**	2	1	**4**	2		1														
Saproscincus challengeri	challenger skink	0	0	**0**	0	1	**1**																	
Saproscincus rosei	no common name	1	1	**2**	0	0	**2**	1																
Ramphotyphlops nigrescens	no common name	3	0	**3**	0	0	**3**	2	1															
Ramphotyphlops silvia	no common name	2	0	**2**	0	1	**3**	2																
Ramphotyphlops weidii	no common name	3	0	**3**	1	1	**5**	3	1															
Aspidites melanocephalus	black-headed python	0	0	**0**	0	2	**2**																	
Liasis maculosus	no common name	0	1	**1**	1	2	**4**		1															
Morelia spilota	carpet python	2	6	**8**	2	19	**29**	2	2								1							
Boiga irregularis	brown tree snake	1	1	**2**	0	4	**6**	1									2							
Dendrelaphis punctulata	common tree snake	2	6	**8**	0	4	**12**	1	1															
Tropidonophis mairii	freshwater snake	0	0	**0**	0	3	**3**																	
Acanthophis antarcticus	common death adder	0	1	**1**	1	1	**3**	1																
Cacophis harriettae	white-crowned snake	1	0	**1**	0	0	**1**			1														
Cacophis krefftii	dwarf crowned snake	1	0	**1**	0	0	**1**	1																
Cacophis squamulosus	golden crowned snake	2	1	**3**	0	1	**4**	2																
Demansia atra	black whip snake	0	0	**0**	2	0	**2**	2																

Appendix 1 continued

Genus species	Common name	No. of std survey records system sites	No. of incid records system sites	**Total records system sites**	No. of std survey records on opp sites	No. of incid. records	**Total no. of records**	Diurn herp srch	Noct herp srch	pitfall	Elliot trap	Hair-tube	Scat srch	Early bird	Late bird	call play-back	Spot-light	Harp -trap	Bat ultra-sonic	Trip-lining	Mist-net	Cave mine srch	Turt trap	Opp bat ultra-sonic
		STD	*ION*	***Total***	*STD*	*INC*	***Total***	*SHD*	*SHN*	*SPT*	*SET*	*SHA*	*SSS*	*SBE*	*SBL*	*SPB*	*SSP*	*STH*	*SUH*	*CTT*	*CTM*	*CAC*	*CTU*	*OUH*
Demansia psammophis	yellow-faced whip snake	6	7	**13**	4	6	**23**	9	1															
Furina diadema	red-naped snake	1	0	**1**	4	0	**5**	5																
Hemiaspis signata	black-bellied swamp snake	1	1	**2**	1	1	**4**	1	1															
Hoplocephalus stephensii	Stephen's banded snake	0	0	**0**	0	1	**1**																	
Pseudechis porphyriacus	red-bellied black snake	2	3	**5**	0	1	**6**	2																
Pseudonaja textilis	eastern brown snake	0	2	**2**	1	6	**9**	1								1								
Rhinoplocephalus boschmai	Carpentaria whip snake	0	1	**1**	0	0	**1**																	
Rhinoplocephalus nigrescens	eastern small-eyed snake	26	8	**34**	6	24	**64**	22	10	1							1							
Simoselaps australis	coral snake	0	0	**0**	3	0	**3**	3																
Tropidechis carinatus	rough-scaled snake	2	0	**2**	0	1	**3**	2																
Vermicella annulata	bandy-bandy	2	1	**3**	0	1	**4**	0	1	1														
Birds																								
Dromaius novaehollandiae	emu		1	**1**		5	**6**																	
Alectura lathami	Australian brush-turkey	9	21	**30**		18	**48**	2						6	4		1							
Coturnix chinensis	king quail	1		**1**			**1**								1									
Coturnix ypsilophora	brown quail	2	3	**5**		2	**7**							1	1									
Anseranas semipalmata	magpie goose					1	**1**																	
Anas gracilis	grey teal					2	**2**																	
Anas superciliosa	pacific black duck	1	4	**5**		14	**19**	1							1	1								

Appendix 1 continued

Genus species	Common name	No. of std survey records system sites	No. of incid records on system sites	**Total records system sites**	No. of std survey records on opp sites	No. of incid. records	**Total no. of records**	Diurn herp srch	Noct herp srch	pitfall	Elliot trap	Hair-tube	Scat srch	Early bird	Late bird	call play-back	Spot-light	Harp -trap	Bat ultra-sonic	Trip-lining	Mist-net	Cave mine srch	Turt trap	Opp bat ultra-sonic
		STD	*ION*	***Total***	*STD*	*INC*	***Total***	*SHD*	*SHN*	*SPT*	*SET*	*SHA*	*SSS*	*SBE*	*SBL*	*SPB*	*SSP*	*STH*	*SUH*	*CTT*	*CTM*	*CAC*	*CTU*	*OUH*
Chenonetta jubata	Australian wood duck	1	3	**4**		11	**15**							1	1									
Dendrocygna eytoni	plumed whistling-duck	0	1	**1**		0	**1**							0	0	1	1							
Tachybaptus novaehollandiae	Australasian grebe	0	0	**0**		3	**3**							0	0									
Anhinga melanogaster	darter	0	0	**0**		2	**2**							0	0									
Phalacrocorax carbo	great cormorant	1	0	**1**		0	**1**							1	0									
Phalacrocorax melanoleucos	little pied cormorant	0	0	**0**		7	**7**							0	0									
Phalacrocorax sulcirostris	little black cormorant	0	1	**1**		0	**1**							0	0									
Phalacrocorax varius	pied cormorant	0	0	**0**		3	**3**							0	0									
Pelecanus conspicillatus	Australian pelican	0	0	**0**		1	**1**							0	0									
Ardea pacifica	white-necked heron	0	0	**0**		6	**6**							0	0									
Butorides striatus	striated heron	0	0	**0**		1	**1**																	
Egretta novaehollandiae	white-faced heron	1	0	**1**		10	**11**							0	1									
Egretta sacra	eastern reef egret	0	0	**0**		1	**1**																	
Ixobrychus flavicollis	black bittern	0	0	**0**		1	**1**																	
Nycticorax caledonicus	nankeen night heron	1	4	**5**		2	**7**							0	1	1	1							
Threskiornis molucca	Australian white ibis	0	0	**0**		1	**1**																	
Accipiter cirrhocephalus	collared sparrowhawk	3	5	**8**		2	**10**							3	0									
Accipiter fasciatus	brown goshawk	2	2	**4**		8	**12**							2	1									
Accipiter novaehollandiae	grey goshawk	4	6	**10**		13	**23**							3	2									

Appendix 1 continued

Genus species	Common name	No. of std survey records system sites	No. of incid records on system sites	**Total records system sites**	No. of std survey records on opp sites	No. of incid. records	**Total no. of records**	Diurn herp srch	Noct herp srch	pitfall	Elliot trap	Hair-tube	Scat srch	Early bird	Late bird	call play-back	Spot-light	Harp -trap	Bat ultra-sonic	Trip-lining	Mist-net	Cave mine srch	Turt trap	Opp bat ultra-sonic
		STD	*ION*	***Total***	*STD*	*INC*	***Total***	*SHD*	*SHN*	*SPT*	*SET*	*SHA*	*SSS*	*SBE*	*SBL*	*SPB*	*SSP*	*STH*	*SUH*	*CTT*	*CTM*	*CAC*	*CTU*	*OUH*
Aquila audax	wedge-tailed eagle	4	15	**19**		20	**39**							1	3									
Aviceda subcristata	Pacific baza	3	15	**18**		5	**23**							2	1		1	1						
Elanus axillaris	black-shouldered kite	1	0	**1**		1	**2**							0	1									
Erythrotriorchis radiatus	red goshawk	0	0	**0**		2	**2**							0	0									
Haliastur sphenurus	whistling kite	1	0	**1**		3	**4**							0	1									
Hieraaetus morphnoides	little eagle	0	1	**1**		0	**1**																	
Lophoictinia isura	square-tailed kite	1	1	**2**		2	**4**							1	1									
Falco berigora	brown falcon	2	2	**4**		3	**7**							1	1									
Falco cenchroides	nankeen kestrel	1	1	**2**		2	**4**								1									
Falco peregrinus	peregrine falcon	1	1	**2**		3	**5**							1										
Falco sp.	unidentified falcon			**0**		0	**0**																	
Grus rubicunda	brolga	0	0	**0**		1	**1**																	
Gallinula tenebrosa	dusky moorhen	0	1	**1**		4	**5**																	
Porphyrio porphyrio	purple swamphen	0	1	**1**		1	**2**									1								
Turnix melanogaster	black-breasted button-quail	5	6	**11**		14	**25**							3	2		1							
Turnix varia	painted button-quail	9	15	**24**		18	**42**	1						8	1									
Numenius madagascariensis	eastern curlew			**0**		2	**2**																	
Burhinus grallarius	bush stone-curlew	0	6	**6**		10	**16**										2							
Charadrius ruficapillus	red-capped plover			**0**		1	**1**																	
Vanellus miles	masked lapwing	1	11	**12**		7	**19**								1	3	6							
Sterna bergii	crested tern			**0**		1	**1**																	
Sterna nilotica	gull-billed tern			**0**		1	**1**																	

Appendix 1 continued

Genus species	Common name	No. of std survey records system sites	No. of incid records on system sites	**Total records system sites**	No. of std survey records on opp sites	No. of incid. records	**Total no. of records**	Diurn herp srch	Noct herp srch	pitfall	Elliot trap	Hair-tube	Scat srch	Early bird	Late bird	call play-back	Spot-light	Harp -trap	Bat ultra-sonic	Trip-lining	Mist-net	Cave mine srch	Turt trap	Opp bat ultra-sonic
		STD	*ION*	***Total***	*STD*	*INC*	***Total***	*SHD*	*SHN*	*SPT*	*SET*	*SHA*	*SSS*	*SBE*	*SBL*	*SPB*	*SSP*	*STH*	*SUH*	*CTT*	*CTM*	*CAC*	*CTU*	*OUH*
Chalcophaps indica	emerald dove	5	3	**8**		9	**17**							4	2									
Columba leucomela	white-headed pigeon	7	2	**9**		2	**11**							6	1									
Geopelia humeralis	bar-shouldered dove	41	1	**42**		17	**59**							34	20		1							
Geopelia striata	peaceful dove	21	5	**26**		16	**42**							14	7									
Geophaps scripta scripta	squatter pigeon - southern race	0	0	**0**		3	**3**																	
Leucosarcia melanoleuca	wonga pigeon	57	3	**60**		16	**76**							45	24			1						
Lopholaimus antarcticus	topknot pigeon	8	2	**10**		3	**13**							6	2									
Macropygia amboinensis	brown cuckoo-dove	46	6	**52**		15	**67**							39	22									
Ocyphaps lophotes	crested pigeon	4	1	**5**		4	**9**							2	3	1								
Phaps chalcoptera	common bronzewing	5	1	**6**		15	**21**							4	1									
Ptilinopus magnificus	wompoo fruit-dove	13	6	**19**		8	**27**							11	6									
Ptilinopus regina	rose-crowned fruit-dove	3	0	**3**		3	**6**							3	1									
Cacatua galerita	sulphur-crested cockatoo	60	2	**62**		18	**80**							41	37	1								
Cacatua roseicapilla	galah	7	0	**7**		5	**12**							7	1									
Calyptorhynchus banksii	red-tailed black-cockatoo	7	0	**7**		5	**12**							6	2									
Calyptorhynchus funereus	yellow-tailed black-cockatoo	28	14	**42**		23	**65**	1						17	14									
Calyptorhynchus lathami	glossy black-cockatoo	15	10	**25**		25	**50**							12	6									

Appendix 1 continued

Genus species	Common name	No. of std survey records on system sites	No. of incid records on system sites	**Total records system sites**	No. of std survey records on opp sites	No. of incid. records	**Total no. of records**	Diurn herp srch	Noct herp srch	pitfall	Elliot trap	Hair-tube	Scat srch	Early bird	Late bird	call play-back	Spot-light	Harp -trap	Bat ultra-sonic	Trip-lining	Mist-net	Cave mine srch	Turt trap	Opp bat ultra-sonic
		STD	*ION*	***Total***	*STD*	*INC*	***Total***	*SHD*	*SHN*	*SPT*	*SET*	*SHA*	*SSS*	*SBE*	*SBL*	*SPB*	*SSP*	*STH*	*SUH*	*CTT*	*CTM*	*CAC*	*CTU*	*OUH*
Nymphicus hollandicus	cockatiel	1	0	**1**		0	**1**							1										
Alisterus scapularis	Australian king parrot	72	24	**96**		31	**127**							59	29									
Aprosmictus erythropterus	red-winged parrot	4		**4**		1	**5**							2	2									
Cyclopsitta diophthalma coxeni	Coxen's fig-parrot					1	**1**																	
Glossopsitta concinna	musk lorikeet	3		**3**		2	**5**							3	1									
Glossopsitta pusilla	little lorikeet	73	2	**75**		19	**94**							53	49									
Platycercus adscitus	pale-headed rosella	55	5	**60**		28	**88**							38	23									
Platycercus elegans	crimson rosella	27	6	**33**		6	**39**							19	17									
Platycercus eximius	eastern rosella	0	1	**1**		1	**2**																	
Trichoglossus chlorolepidotus	scaly-breasted lorikeet	84	2	**86**		16	**102**							55	55									
Trichoglossus haematodus	rainbow lorikeet	142	3	**145**		44	**189**							115	100									
Cacomantis flabelliformis	fan-tailed cuckoo	88	6	**94**		37	**131**							66	44	1	1							
Cacomantis variolosus	brush cuckoo	10	3	**13**		5	**18**							7	4	1								
Chrysococcyx basalis	Horsfield's bronze-cuckoo	4	0	**4**		0	**4**							2	3									
Chrysococcyx lucidus	shining bronze-cuckoo	83	5	**88**		27	**115**							58	52	1	2							
Chrysococcyx minutillus	little bronze-cuckoo	2	3	**5**		2	**7**							1	1									
Chrysococcyx osculans	black-eared cuckoo	1	0	**1**		2	**3**							0	1									

Appendix 1 continued

Genus species	Common name	No. of std survey records system sites	No. of incid records system sites	**Total records system sites**	No. of std survey records on opp sites	No. of incid. records	**Total no. of records**	Diurn herp srch	Noct herp srch	pitfall	Elliot trap	Hair-tube	Scat srch	Early bird	Late bird	call play-back	Spot-light	Harp -trap	Bat ultra-sonic	Trip-lining	Mist-net	Cave mine srch	Turt trap	Opp bat ultra-sonic
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Cuculus pallidus	pallid cuckoo	1	0	**1**		0	**1**							1	0									
Cuculus saturatus	oriental cuckoo	1	0	**1**		0	**1**							1	0									
Eudynamys scolopacea	common koel	12	13	**25**		8	**33**		1					6	9	8	3							
Scythrops novaehollandiae	channel-billed cuckoo	13	5	**18**		9	**27**							12	2	1								
Centropus phasianinus	pheasant coucal	31	7	**38**		11	**49**							29	11									
Ninox connivens	barking owl	3	1	**4**	0	5	**9**						1	1		1	2							
Ninox novaeseelandiae	southern boobook	76	20	**96**	17	30	**143**	1	1							53	42							
Ninox strenua	powerful owl	14	4	**18**	4	1	**23**									11	3							
Tyto alba	barn owl	0	1	**1**	1	0	**2**									0	0							
Tyto novaehollandiae	masked owl	7	2	**9**	5	6	**20**									3	5							
Tyto tenebricosa	sooty owl	7	5	**12**	6	2	**20**									7								
Podargus ocellatus plumiferus	plumed frogmouth	15	0	**15**	17	6	**38**									14	6							
Podargus strigoides	tawny frogmouth	22	14	**36**	2	48	**86**		1					2	0	3	17							
Eurostopodus mystacalis	white-throated nightjar	26	9	**35**	2	22	**59**		1							16	19							
Aegotheles cristatus	Australian owlet-nightjar	131	12	**143**	18	33	**194**		4					1	3	85	73							
Apus pacificus	fork-tailed swift	0	0	**0**		1	**1**																	
Aerodramus spodiopygius	white-rumped swiftlet	0	1	**1**		0	**1**																	
Hirundapus caudacutus	white-throated needletail	9	4	**13**		4	**17**							6	3									
Alcedo azurea	azure kingfisher	3	6	**9**		14	**23**							3	1									
Dacelo novaeguineae	laughing kookaburra	121	9	**130**		46	**176**							87	72	1	5							

Appendix 1 continued

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		STD	*ION*	***Total***	*STD*	*INC*	***Total***	*SHD*	*SHN*	*SPT*	*SET*	*SHA*	*SSS*	*SBE*	*SBL*	*SPB*	*SSP*	*STH*	*SUH*	*CTT*	*CTM*	*CAC*	*CTU*	*OUH*
Todiramphus macleayii	forest kingfisher	18	0	**18**		9	**27**							10	10									
Todiramphus pyrrhopygia	red-backed kingfisher			**0**		1	**1**																	
Todiramphus sanctus	sacred kingfisher	13	4	**17**		11	**28**							12	7	1								
Merops ornatus	rainbow bee-eater	75	12	**87**		31	**118**							52	43									
Eurystomus orientalis	dollarbird	8	4	**12**		8	**20**							6	4		1							
Pitta versicolor	noisy pitta	25	4	**29**		13	**42**		1					11	10	8	7							
Menura alberti	Albert's lyrebird	6	0	**6**		3	**9**							6	5									
Climacteris erythrops	red-browed treecreeper	3	3	**6**		10	**16**							3	2									
Climacteris picumnus	brown treecreeper	17	2	**19**		6	**25**							13	9									
Cormobates leucophaeus	white-throated treecreeper	215	2	**217**		40	**257**							191	166	1								
Malurus cyaneus	superb fairy-wren	8	1	**9**		6	**15**							4	4									
Malurus lamberti	variegated fairy-wren	39	14	**53**		19	**72**							23	25									
Malurus melanocephalus	red-backed fairy-wren	35	9	**44**		17	**61**							19	24									
Acanthiza chrysorrhoa	yellow-rumped thornbill			**0**		1	**1**																	
Acanthiza lineata	striated thornbill	39	3	**42**		0	**42**							24	27									
Acanthiza nana	yellow thornbill	7	2	**9**		4	**13**							3	4									
Acanthiza pusilla	brown thornbill	114	2	**116**		29	**145**							89	92									
Acanthiza reguloides	buff-rumped thornbill	56	9	**65**		26	**91**	1						35	44									
Chthonicola sagittata	speckled warbler	10	1	**11**		12	**23**							7	6									

Appendix 1 continued

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		STD	*ION*	***Total***	*STD*	*INC*	***Total***	*SHD*	*SHN*	*SPT*	*SET*	*SHA*	*SSS*	*SBE*	*SBL*	*SPB*	*SSP*	*STH*	*SUH*	*CTT*	*CTM*	*CAC*	*CTU*	*OUH*
Gerygone fusca	western gerygone	0	1	**1**		0	**1**							0	0									
Gerygone magnirostris	large-billed gerygone	3	1	**4**		0	**4**							2	1									
Gerygone mouki	brown gerygone	64	3	**67**		16	**83**							54	56									
Gerygone olivacea	white-throated gerygone	66	5	**71**		27	**98**							50	43									
Gerygone palpebrosa	fairy gerygone	2	1	**3**		3	**6**							1	1									
Pardalotus punctatus	spotted pardalote	176	1	**177**		36	**213**							147	160									
Pardalotus striatus	striated pardalote	102	8	**110**		28	**138**							75	72									
Sericornis citreogularis	yellow-throated scrubwren	20	1	**21**		0	**21**							19	9									
Sericornis frontalis	white-browed scrubwren	109	5	**114**		35	**149**							88	75									
Sericornis magnirostris	large-billed scrubwren	59	1	**60**		10	**70**							42	46									
Smicrornis brevirostris	weebill	22	0	**22**		14	**36**							19	24									
Acanthorhynchus tenuirostris	eastern spinebill	39	3	**42**		14	**56**							31	24									
Anthochaera carunculata	red wattlebird	3	1	**4**		2	**6**							2	2									
Anthochaera chrysoptera	little wattlebird	18	0	**18**		2	**20**							9	9									
Entomyzon cyanotis	blue-faced honeyeater	35	5	**40**		21	**61**	1						23	23									
Grantiella picta	painted honeyeater	0	0	**0**		1	**1**							0	0									
Lichenostomus chrysops	yellow-faced honeyeater	139	0	**139**		37	**176**	2						118	112			1						
Lichenostomus fasciogularis	mangrove honeyeater			**0**		1	**1**																	

Appendix 1 continued

Genus species	Common name	No. of std survey records system sites	No. of incid records system sites	**Total records system sites**	No. of std survey records on opp sites	No. of incid. records	**Total no. of records**	Diurn herp srch	Noct herp srch	pitfall	Elliot trap	Hair-tube	Scat srch	Early bird	Late bird	call play-back	Spot-light	Harp -trap	Bat ultra-sonic	Trip-lining	Mist-net	Cave mine srch	Turt trap	Opp bat ultra-sonic
		STD	*ION*	***Total***	*STD*	*INC*	***Total***	*SHD*	*SHN*	*SPT*	*SET*	*SHA*	*SSS*	*SBE*	*SBL*	*SPB*	*SSP*	*STH*	*SUH*	*CTT*	*CTM*	*CAC*	*CTU*	*OUH*
Lichenostomus fuscus	fuscous honeyeater	21	1	**22**		8	**30**							21	16									
Lichenostomus leucotis	white-eared honeyeater	6	1	**7**		4	**11**							4	3									
Lichenostomus melanops	yellow-tufted honeyeater	12	1	**13**		24	**37**							9	10									
Lichmera indistincta	brown honeyeater	34	2	**36**		10	**46**	1						30	23									
Manorina flavigula	yellow-throated miner	0	0	**0**		1	**1**							0	0									
Manorina melanocephala	noisy miner	84	3	**87**		31	**118**	2						66	70									
Manorina melanophrys	bell miner	11	0	**11**		8	**19**							11	8									
Meliphaga lewinii	Lewin's honeyeater	159	5	**164**		54	**218**							149	137		1							
Melithreptus albogularis	white-throated honeyeater	98	5	**103**		12	**115**							80	78									
Melithreptus brevirostris	brown-headed honeyeater	3	2	**5**		8	**13**							3	2									
Melithreptus gularis	black-chinned honeyeater	10	3	**13**		10	**23**							9	6									
Melithreptus lunatus	white-naped honeyeater	79	6	**85**		20	**105**							68	51									
Myzomela obscura	dusky honeyeater	5	1	**6**		3	**9**							2	3									
Myzomela sanguinolenta	scarlet honeyeater	126	5	**131**		40	**171**							104	103									
Philemon citreogularis	little friarbird	24	2	**26**		13	**39**							18	15									
Philemon corniculatus	noisy friarbird	135	7	**142**		55	**197**	3						121	106	1								
Phylidonyris nigra	white-cheeked honeyeater	8	0	**8**		1	**9**							6	2									
Phylidonyris novaehollandiae	new holland honeyeater	1	0	**1**		3	**4**							0	1									

Appendix 1 continued

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		STD	*ION*	***Total***	*STD*	*INC*	***Total***	*SHD*	*SHN*	*SPT*	*SET*	*SHA*	*SSS*	*SBE*	*SBL*	*SPB*	*SSP*	*STH*	*SUH*	*CTT*	*CTM*	*CAC*	*CTU*	*OUH*
Plectorhyncha lanceolata	striped honeyeater	3	4	**7**		5	**12**							2	1									
Eopsaltria australis	eastern yellow robin	141	8	**149**		40	**189**	2						105	92	1								
Microeca fascinans	jacky winter	32	7	**39**		16	**55**							27	22									
Petroica rosea	rose robin	28	5	**33**		10	**43**	1						19	19									
Tregellasia capito	pale-yellow robin	8	4	**12**		0	**12**							5	4									
Orthonyx temminckii	logrunner	12	2	**14**		1	**15**							9	8									
Pomatostomus temporalis	grey-crowned babbler	19	3	**22**		11	**33**							13	10									
Cinclosoma punctatum	spotted quail-thrush	6	7	**13**		18	**31**							4	2		1							
Psophodes olivaceus	eastern whipbird	120	3	**123**		30	**153**	1						105	82	1		1						
Daphoenositta chrysoptera	varied sittella	26	13	**39**		25	**64**	3						13	16									
Colluricincla megarhyncha	little shrike-thrush	23	5	**28**		9	**37**							15	16									
Colluricincla harmonica	grey shrike-thrush	216	7	**223**		50	**273**	1						184	161									
Falcunculus frontatus	crested shrike-tit	10	8	**18**		7	**25**	1						9	2									
Pachycephala pectoralis	golden whistler	140	7	**147**		36	**183**							111	113									
Pachycephala rufiventris	rufous whistler	140	4	**144**		34	**178**							120	108									
Dicrurus bracteatus	spangled drongo	26	5	**31**		14	**45**							17	16	1								
Grallina cyanoleuca	magpie lark	11	2	**13**		9	**22**							8	7									
Monarcha leucotis	white-eared monarch	4	4	**8**		5	**13**							2	3									

Appendix 1 continued

Genus species	Common name	No. of std survey records system sites	No. of incid records system sites	**Total records system sites**	No. of std survey records on opp sites	No. of incid. records	**Total no. of records**	Diurn herp srch	Noct herp srch	pitfall	Elliot trap	Hair-tube	Scat srch	Early bird	Late bird	call play-back	Spot-light	Harp -trap	Bat ultra-sonic	Trip-lining	Mist-net	Cave mine srch	Turt trap	Opp bat ultra-sonic
		STD	*ION*	***Total***	*STD*	*INC*	***Total***	*SHD*	*SHN*	*SPT*	*SET*	*SHA*	*SSS*	*SBE*	*SBL*	*SPB*	*SSP*	*STH*	*SUH*	*CTT*	*CTM*	*CAC*	*CTU*	*OUH*
Monarcha melanopsis	black-faced monarch	19	1	**20**		5	**25**							13	16									
Monarcha trivirgatus	spectacled monarch	9	10	**19**		7	**26**							8	5									
Myiagra cyanoleuca	satin flycatcher	0	1	**1**		1	**2**							0	0									
Myiagra inquieta	restless flycatcher	8	3	**11**		9	**20**							7	4									
Myiagra rubecula	leaden flycatcher	62	2	**64**		17	**81**	2						53	42			1						
Rhipidura fuliginosa	grey fantail	176	1	**177**		39	**216**							152	143									
Rhipidura leucophrys	willie wagtail	28	1	**29**		23	**52**							21	15		1							
Rhipidura rufifrons	rufous fantail	29	3	**32**		15	**47**							23	24									
Coracina lineata	barred cuckoo-shrike	2	0	**2**		5	**7**							2	1	1								
Coracina maxima	ground cuckoo-shrike	0	0	**0**		1	**1**							0	0									
Coracina novaehollandiae	black-faced cuckoo-shrike	68	76	**144**		24	**168**							52	26									
Coracina papuensis	white-bellied cuckoo-shrike	35	4	**39**		15	**54**							24	22									
Coracina tenuirostris	cicadabird	42	3	**45**		10	**55**							39	27									
Lalage leucomela	varied triller	40	9	**49**		15	**64**							26	23									
Lalage sueurii	white-winged triller	1	0	**1**		2	**3**							1	0									
Oriolus sagittatus	olive-backed oriole	55	9	**64**		18	**82**							43	29									
Sphecotheres viridis	figbird	33	4	**37**		15	**52**							20	19									
Artamus cyanopterus	dusky woodswallow	14	10	**24**		12	**36**							10	6									
Artamus leucorynchus	white-breasted woodswallow	6	0	**6**		1	**7**							0	2									
Artamus minor	little woodswallow	0	1	**1**		0	**1**							0	0									

Appendix 1 continued

Genus species	Common name	No. of std survey records system sites	No. of incid records on system sites	**Total records system sites**	No. of std survey records on opp sites	No. of incid. records	**Total no. of records**	Diurn herp srch	Noct herp srch	pitfall	Elliot trap	Hair-tube	Scat srch	Early bird	Late bird	call play-back	Spot-light	Harp -trap	Bat ultra-sonic	Trip-lining	Mist-net	Cave mine srch	Turt trap	Opp bat ultra-sonic
		STD	*ION*	***Total***	*STD*	*INC*	***Total***	*SHD*	*SHN*	*SPT*	*SET*	*SHA*	*SSS*	*SBE*	*SBL*	*SPB*	*SSP*	*STH*	*SUH*	*CTT*	*CTM*	*CAC*	*CTU*	*OUH*
Artamus superciliosus	white-browed woodswallow	2	0	**2**		1	**3**							0	2									
Cracticus nigrogularis	pied butcherbird	47	0	**47**		11	**58**							38	22									
Cracticus torquatus	grey butcherbird	98	5	**103**		33	**136**							81	65									
Gymnorhina tibicen	Australian magpie	104	2	**106**		29	**135**							94	44									
Strepera graculina	pied currawong	163	4	**167**		60	**227**							139	114	1								
Ptiloris paradiseus	paradise riflebird	21	5	**26**		18	**44**							17	5									
Corvus coronoides	Australian raven	2	2	**4**		2	**6**							1	1									
Corvus orru	Torresian crow	153	7	**160**		51	**211**	1						122	105									
Corcorax melanorhamphos	white-winged chough	6	3	**9**		11	**20**							2	4			1						
Struthidea cinerea	apostlebird	0	1	**1**		3	**4**							0	0									
Ailuroedus crassirostris	green catbird	21	6	**27**		14	**41**							17	9									
Ptilonorhynchus violaceus	satin bowerbird	25	5	**30**		10	**40**							22	13									
Sericulus chrysocephalus	regent bowerbird	8	1	**9**		8	**17**							1	8									
Anthus novaeseelandiae	Richard's pipit	0	1	**1**		0	**1**							0	0									
Lonchura punctulata	chesnut-breasted mannikin			**0**		1	**1**																	
Neochmia modesta	plum-headed finch	0	0	**0**		1	**1**							0	0									
Neochmia temporalis	red-browed finch	49	12	**61**		27	**88**							34	28									
Taeniopygia bichenovii	double-barred finch	5	4	**9**		13	**22**							2	3									
Dicaeum hirundinaceum	mistletoebird	85	21	**106**		35	**141**							45	71									

Appendix 1 continued

Genus species	Common name	No. of std survey records system sites	No. of incid records on system sites	**Total records system sites**	No. of std survey records on opp sites	No. of incid. records	**Total no. of records**	Diurn herp srch	Noct herp srch	pitfall	Elliot trap	Hair-tube	Scat srch	Early bird	Late bird	call play-back	Spot-light	Harp -trap	Bat ultra-sonic	Trip-lining	Mist-net	Cave mine srch	Turt trap	Opp bat ultra-sonic
		STD	*ION*	***Total***	*STD*	*INC*	***Total***	*SHD*	*SHN*	*SPT*	*SET*	*SHA*	*SSS*	*SBE*	*SBL*	*SPB*	*SSP*	*STH*	*SUH*	*CTT*	*CTM*	*CAC*	*CTU*	*OUH*
Hirundo ariel	fairy martin					5	**5**																	
Hirundo neoxena	welcome swallow	1	6	**7**		10	**17**							1	1									
Hirundo nigricans	tree martin	5	6	**11**		3	**14**							3	3									
Acrocephalus stentoreus	clamorous reed-warbler					1	**1**																	
Cincloramphus mathewsi	rufous songlark		1	**1**			**1**																	
Cisticola exilis	golden-headed cisticola		1	**1**		2	**3**																	
Megalurus timoriensis	tawny grassbird	1		**1**		2	**3**								1									
Zosterops lateralis	silvereye	121	4	**125**		25	**150**							100	74			1						
Zoothera heinei	russet-tailed thrush	10	6	**16**		7	**23**							8	4			1						
Mammals																								
Ornithorhynchus anatinus	platypus		1	**1**		1	**2**																	
Tachyglossus aculeatus	short-beaked echidna		18	**18**		17	**35**	3					3				2							
Antechinus flavipes	yellow-footed antechinus	46	1	**47**	1		**48**			1	28	17					1							
Antechinus stuartii	brown antechinus	14		**14**	1	1	**16**				8	8					2							
Phascogale tapoatafa	brush-tailed phascogale	3		**3**		1	**4**				1	2												
Planigale maculata	common planigale	10	1	**11**			**11**			10														
Sminthopsis murina	common dunnart	3	1	**4**	2	1	**7**	3	1	4	2						1							
Isoodon macrourus	northern brown bandicoot	23	7	**30**		3	**33**	1				19	7				2							
Perameles nasuta	long-nosed bandicoot	19	4	**23**			**23**	8	1		1	6	2				13							
Phascolarctos cinereus	koala	14	18	**32**		18	**50**	1					1			1	15							

Appendix 1 continued

Genus species	Common name	No. of std survey records system sites	No. of incid records system sites	**Total records system sites**	No. of std survey records on opp sites	No. of incid. records	**Total no. of records**	Diurn herp srch	Noct herp srch	pitfall	Elliot trap	Hair-tube	Scat srch	Early bird	Late bird	call play-back	Spot-light	Harp -trap	Bat ultra-sonic	Trip-lining	Mist-net	Cave mine srch	Turt trap	Opp bat ultra-sonic
		STD	*ION*	***Total***	*STD*	*INC*	***Total***	*SHD*	*SHN*	*SPT*	*SET*	*SHA*	*SSS*	*SBE*	*SBL*	*SPB*	*SSP*	*STH*	*SUH*	*CTT*	*CTM*	*CAC*	*CTU*	*OUH*
Petaurus australis australis	yellow-bellied glider	48	14	**62**	5	84	**151**	2	3							34	38							
Petaurus breviceps	sugar glider	59	23	**82**	7	24	**113**		3				1			16	50							
Petaurus norfolcensis	squirrel glider	10	19	**29**		8	**37**		4		1					5	10							
Petauroides volans	greater glider	43	4	**47**	1	36	**84**										44							
Acrobates pygmaeus	feathertail glider	18	1	**19**		7	**26**						1				18							
Pseudocheirus peregrinus	common ringtail possum	17	2	**19**	1	4	**24**									2	18							
Trichosurus caninus	mountain brushtail possum	14	6	**20**	1	11	**32**									3	15							
Trichosurus vulpecula	common brushtail possum	29	32	**61**	1	24	**86**					31	1			6	30							
Aepyprymnus rufescens	rufous bettong	4	11	**15**		14	**29**					2					2							
Potorous tridactylus	long-nosed potoroo	1	1	**2**		1	**3**										1							
Macropus dorsalis	black-striped wallaby	2	3	**5**		9	**14**	1	1								2							
Macropus giganteus	eastern grey kangaroo	2	6	**8**		17	**25**	1					1			1	2							
Macropus parryi	whiptail wallaby		5	**5**		9	**14**																	
Macropus rufogriseus	red-necked wallaby		6	**6**		17	**23**					1				1								
Petrogale herberti	Herbert's rock-wallaby		1	**1**		4	**5**						1											
Petrogale penicillata	brush-tailed rock-wallaby		1	**1**		3	**4**																	
Thylogale stigmatica	red-legged pademelon		1	**1**		1	**2**																	
Thylogale thetis	red-necked pademelon	1	7	**8**		9	**17**						1				1							

Appendix 1 continued

Genus species	Common name	No. of std survey records system sites	No. of incid records system sites	**Total records system sites**	No. of std survey records on opp sites	No. of incid. records	**Total no. of records**	Diurn herp srch	Noct herp srch	pitfall	Elliot trap	Hair-tube	Scat srch	Early bird	Late bird	call play-back	Spot-light	Harp -trap	Bat ultra-sonic	Trip-lining	Mist-net	Cave mine srch	Turt trap	Opp bat ultra-sonic
		STD	*ION*	***Total***	*STD*	*INC*	***Total***	*SHD*	*SHN*	*SPT*	*SET*	*SHA*	*SSS*	*SBE*	*SBL*	*SPB*	*SSP*	*STH*	*SUH*	*CTT*	*CTM*	*CAC*	*CTU*	*OUH*
Wallabia bicolor	swamp wallaby	11	14	**25**	2	18	**45**					2	10			1	1							
Nyctimene robinsoni	eastern tube-nosed bat	1	2	**3**	1	3	**7**										1	2						
Pteropus alecto	black flying-fox					2	**2**																	
Pteropus poliocephalus	grey-headed flying-fox	11	1	**12**	1	9	**22**						1			4	12							
Pteropus scapulatus	little red flying-fox		2	**2**		6	**8**									3								
Syconycteris australis	common blossom bat	2		**2**	9		**11**											11						
Rhinolophus megaphyllus	eastern horseshoe-bat	28	1	**29**	33		**62**											45	18					1
Hipposideros ater	dusky leaf-nosed bat				1		**1**											1						
Saccolaimus flaviventris	yellow-bellied sheathtail-bat	5	4	**9**	3	4	**16**										1		6					2
Taphozous georgianus	common sheathtail-bat					3	**3**												1					
Mormopterus beccarii	Beccari's freetail bat	4		**4**	1		**5**												5					
Mormopterus sp.	unidentified free-tail bat	24		**24**	19		**43**												36	5	2			4
Nyctinomus australis	white-striped freetail-bat	6	36	**42**	3	22	**67**	2								5	21		8		1			
Chalinolobus gouldii	Gould's wattled bat	21		**21**	31	1	**53**											11	31	4	5			7
Chalinolobus morio	chocolate wattled bat	9		**9**	17		**26**											22	2					2
Chalinolobus nigrogriseus	hoary wattled bat	7		**7**	16		**23**											8	10		2			4
Chalinolobus picatus	little pied bat	3		**3**	7		**10**											8			2			
Kerivoula papuensis	golden-tipped bat	2		**2**	8		**10**											10						

Appendix 1 continued

Genus species	Common name	No. of std survey records system sites	No. of incid records system sites	**Total records system sites**	No. of std survey records on opp sites	No. of incid. records	**Total no. of records**	Diurn herp srch	Noct herp srch	pitfall	Elliot trap	Hair-tube	Scat srch	Early bird	Late bird	call play-back	Spot-light	Harp -trap	Bat ultra-sonic	Trip-lining	Mist-net	Cave mine srch	Turt trap	Opp bat ultra-sonic
		STD	*ION*	***Total***	*STD*	*INC*	***Total***	*SHD*	*SHN*	*SPT*	*SET*	*SHA*	*SSS*	*SBE*	*SBL*	*SPB*	*SSP*	*STH*	*SUH*	*CTT*	*CTM*	*CAC*	*CTU*	*OUH*
Miniopterus australis	little bent-wing bat	27	1	**28**	61	3	**92**											65	19	1	2			5
Miniopterus schreibersii	common bent-wing bat	8		**8**	14	6	**28**											9	9		1			3
Myotis sp.	large-footed myotis			**0**	2	1	**3**											2						1
Nyctophilus bifax	eastern long-eared bat	18		**18**	38		**56**											50	3	1	1			2
Nyctophilus geoffroyi	lesser long-eared bat	1		**1**	13		**14**											13			2			
Nyctophilus gouldi	Gould's long-eared bat	16		**16**	47		**63**											58	2	1	4			1
Nyctophilus sp.	unidentified long-eared bat	12		**12**	6		**18**											1	15					2
Scoteanax rueppellii	greater broad-nosed bat				10		**10**											2		5	4			1
Scotorepens balstoni	inland broad-nosed bat				2		**2**											2						
Scotorepens orion	eastern broad-nosed bat	2		**2**	5		**7**											4		1				2
Scotorepens sp.	unidentified broad-nosed bat	9		**9**	11	9	**29**											8	14	3	2			6
Vespadelus darlingtoni	large forest bat	3		**3**	3		**6**											4	2					
Vespadelus pumilus	eastern forest bat	26		**26**	42	1	**69**											47	22	3	3			2
Vespadelus troughtoni	eastern cave bat	2		**2**	6	1	**9**											4	4					
Vespadelus vulturnus	little forest bat	1		**1**	3		**4**											4						
Hydromys chrysogaster	water rat		4	**4**		7	**11**										2							
Melomys burtoni	grassland melomys	10		**10**	4		**14**				8	2												
Melomys cervinipes	fawn-footed melomys	90	2	**92**	1	2	**95**			1	55	29	1				7							

Appendix 1 continued

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		STD	*ION*	***Total***	*STD*	*INC*	***Total***	*SHD*	*SHN*	*SPT*	*SET*	*SHA*	*SSS*	*SBE*	*SBL*	*SPB*	*SSP*	*STH*	*SUH*	*CTT*	*CTM*	*CAC*	*CTU*	*OUH*
Melomys sp.	unidentified melomys sp.		1	**1**			**1**																	
Mus musculus	house mouse	79	3	**82**	1	1	**84**		1	7	40	33					1							
Pseudomys delicatulus	delicate mouse	7		**7**			**7**				7													
Pseudomys gracilicaudatus	eastern chestnut mouse	8		**8**			**8**			2	8													
Pseudomys patrius	eastern pebble-mound mouse	11		**11**	2	1	**14**			1	12	1												
Pseudomys sp.	unidentified pseudomys species	2		**2**			**2**	1				2												
Rattus fuscipes	bush rat	121	2	**123**	6	3	**132**			1	74	52	1				3							
Rattus lutreolus	swamp rat	1		**1**			**1**					1												
Rattus rattus	black rat	5		**5**			**5**				4	1												
Rattus tunneyi	pale field-rat	21		**21**			**21**				9	12												
Xeromys myoides	false water rat				1		**1**				1													
Canis familiaris	dingo and dog (feral)	17	25	**42**	9	17	**68**	1				1	25	1		5	9							
Vulpes vulpes	fox	3	2	**5**	1		**6**	1				1	4											
Felis catus	cat (feral)	3	3	**6**	1	5	**12**					3												
Lepus capensis	brown hare		1	**1**		9	**10**																	
Oryctolagus cuniculus	rabbit		3	**3**		8	**11**																	
Equus caballus	horse (feral)		9	**9**		3	**12**																	
Sus scrofa	pig (feral)					8	**8**										1							
Bos taurus	cattle (feral)		3	**3**		1	**4**					1					1							
Capra hircus	goat (feral)		1	**1**			**1**																	
Cervus elaphus	red deer		3	**3**		5	**8**																	

Appendix 2 Forest-dependent vertebrate species (excluding fish) of conservation concern as identified by the Response to Disturbance project (DNR, DoE and EA 1998)

Status refers to QLD state legislation *Nature Conservation Act Wildlife Regulations 1994*; E=Endangered, V=Vulnerable, R=Rare.

Genus	Species	Common name	Status
Adelotus	*brevis*	tusked frog	
Mixophyes	*fleayi*	Fleay's barred-frog	E
Mixophyes	*iteratus*	giant barred-frog	E
Rheobatrachus	*silus*	southern platypusfrog	E
Taudactylus	*diurnus*	southern dayfrog	E
Taudactylus	*pleione*	Kroombit tinkerfrog	V
Litoria	*brevipalmata*	green-thighed frog	R
Litoria	*freycineti*	wallum rocketfrog	
Litoria	*olongburensis*	wallum sedgefrog	
Litoria	*pearsoniana*	cascade treefrog	
Litoria	*revelata*	whirring treefrog	
Litoria	*sp. cf. cooloolensis*		
Litoria	*sp. cf. barringtonensis*		
Crinia	*tinnula*	wallum froglet	
Limnodynastes	*salmini*	salmon-striped frog	
Reptiles			
Elseya	*sp.*		
Elusor	*macrurus*	Mary River turtle	V
Chlamydosaurus	*kingii*	frilled lizard	
Eroticoscincus	*graciloides*	elf skink	R
Nangura	*spinosa*	Nangur skink	R
Delma	*torquata*	collared delma	
Delma	*plebia*	common delma	
Paradelma	*orientalis*	brigalow scaly-foot	
Ophioscinus	*truncatus truncatus*		
Eremiascinus	*richardsonii*	broad-banded sand swimmer	
Anomalopus	*leuckartii*		
Saiphos	*equalis*		
Acanthophis	*antarcticus*	common death adder	R
Denisonia	*maculata*	ornamental snake	V
Furina	*dunmalli*	Dunmall's snake	V
Hemiaspis	*damelli*	grey snake	
Hoplocephalus	*bitorquartos*	pale-headed snake	
Hoplocephalus	*stephensii*	Stephen’s banded snake	
Pseudechis	*guttatus*	spotted black snake	

Genus	Species	Common name	Status*
Birds			
Lophoictinia	*isura*	square-tailed kite	R
Erythrotriorchis	*radiatus*	red goshawk	E
Rallus	*pectoralis*	Lewin's rail	R
Turnix	*melanogaster*	black-breasted button-quail	V
Geophaps	*scripta scripta*	squatter pigeon (sth subsp.)	V
Ptilinopus	*superbus*	superb fruit-dove	R
Calyptorhynchus	*lathami*	glossy black-cockatoo	V
Cyclopsitta	*diophthalma coxeni*	Coxen's fig-parrot	E
Ninox	*strenua*	powerful owl	V
Tyto	*tenebricosa*	sooty owl	R
Tyto	*novaehollandiae*	masked owl	R
Podargus	*ocellatus plumiferus*	plumed frogmouth	V
Menura	*alberti*	albert's lyrebird	R
Atrichornis	*rufescens*	rufous scrub-bird	V
Climacteris	*erythrops*	red-browed treecreeper	R
Dasyornis	*brachypterus*	eastern bristlebird	E
Xanthomyza	*phrygia*	regent honeyeater	E
Lichenostomus	*melanops*	yellow-tufted honeyeater	R
Melithreptus	*gularis*	black-chinned honeyeater	R
Poephila	*cincta cincta*	black-throated finch (sth subsp.)	V

Genus	Species	Common name	Status*
Mammals			
Ornithorhynchus	*anatinus*	platypus	
Antechinus	*swainsonii*	dusky antechinus	
Dasyurus	*hallucatus*	northern quoll	
Dasyurus	*maculatus maculatus*	spotted-tailed quoll (sth subsp.)	V
Phascogale	*tapoatafa*	brush-tailed phascogale	
Phascolarctos	*cinereus*	koala	
Cercartetus	*nanus*	eastern pygmy possum	
Petaurus	*australis australis*	yellow-bellied glider (sth subsp.)	
Petaurus	*norfolcensis*	squirrel glider	
Petauroides	*volans*	greater glider	
Pseudocheirus	*peregrinus rubidus*	common ringtail possum	
Aepyprymnus	*rufescens*	rufous bettong	
Potorous	*tridactylus*	long-nosed potoroo	
Macropus	*agilis*	agile wallaby	
Macropus	*dorsalis*	black-striped wallaby	
Petrogale	*herberti*	Herbert's rock-wallaby	
Petrogale	*penicillata*	brush-tailed rock-wallaby	V
Thylogale	*stigmatica*	red-legged pademelon	
Nyctimene	*robinsoni*	eastern tube-nosed bat	
Pteropus	*alecto*	black flying-fox	
Pteropus	*poliocephalus*	grey-headed flying-fox	
Pteropus	*scapulatus*	little red flying-fox	
Syconycteris	*australis*	common blossom bat	
Taphozous	*georgianus*	common sheathtail-bat	
Mormopterus	*norfolkensis*	eastern freetail-bat	
Hipposideros	*semoni*	Semon's leafnosed-bat	
Chalinolobus	*dwyeri*	large-eared pied bat	R
Chalinolobus	*picatus*	little pied bat	R
Falsistrellus	*tasmaniensis*	eastern false pipistrelle	
Kerivoula	*papuensis*	golden-tipped bat	R
Miniopterus	*australis*	little bentwing-bat	
Miniopterus	*schreibersii*	common bentwing-bat	
Myotis	*moluccarum*	large-footed myotis	
Scotorepens	*sanborni*	northern broad-nosed bat	
Scotorepens	*sp.*		
Vespadelus	*darlingtoni*	large forest bat	
Vespadelus	*regulus*	southern forest bat	
Vespadelus	*troughtoni*	eastern cave bat	
Vespadelus	*vulturnus*	little forest bat	
Pseudomys	*novaehollandiae*	New Holland mouse	
Pseudomys	*oralis*	Hastings river mouse	V
Pseudomys	*patrius*	eastern pebble-mound mouse	
Xeromys	*myoides*	false water rat	V

Appendix 3 Metadata Statement

South-east Queensland Comprehensive Regional Assessment Fauna Survey Database

Dataset

Title: South-east Queensland Comprehensive Regional Assessment Fauna Survey Database

Jurisdiction: South-east Queensland

Custodian: Queensland Department of Environment

Description

Abstract: This database contains information, in two tables, on the location (sites table) and abundance of vertebrate fauna species detected during systematic surveys (species table). Sites where formal surveys were conducted but where no species were detected are included also. Each record is linked to a particular CRA site code which is referenced in both Australian Map Grid and geographic (latitude and longitude). A code representing the survey method used to provide each record is also provided. A third table (incidental table) contains the locality data of vertebrate fauna species recorded incidentally during the CRA surveys.

Search Words: VERTEBRATE FAUNA, FOREST FAUNA, FAUNA distribution, FAUNA abundance.

Attribute List: **1. Sites Table**

CRA SURVEY CODE	Unique number for each record obtained during sytematic surveys.
SITE CODE	Code for each site where systematic fauna surveys were conducted, based on team undertaking survey.
SITE TYPE	Whether the survey site was a standard, opportunistic or incidental site.
SURVEY	Whether the survey was conducted during winter or summer months.
DATE START	Date of the first day of the survey period.
DATE FINISH	Date of the last day of the survey period.
TEAM	Name of survey team conducting survey.
LOCALITY DESCRIPTION	Description of the location of the survey site.
ZONE	Australian Map Grid Zone.
AMG EAST	AMG easting.
AMG NORTH	AMG northing.
LATITUDE	Latitude in decimal degrees.
LONGITUDE	Longitude in decimal degrees.
ALTITUDE	Altitude in metres.
ASPECT	Aspect of survey site in metres.
SLOPE	Slope of survey site in degrees.
TENURE	SF = State Forest, TR = Timber Reserve, NP = National Park, EP = Environmental Park.
RESERVE NAME	Name of reserve where survey conducted.
RESERVE NUMBER	Number of reserve where survey conducted.
PARISH	Name of Parish where survey conducted.
HABITAT DESCRIPTION	Qualitative description of habitat at the survey site.
TOPOCODE	Code for topographic position, RI = Ridge, MS = Midslope, GU = Gully.
MAP	Name and resolution of map used during the survey.
SOURCE	Data source ; CRA Fauna Survey Team

2. Species Table

RECORD NUMBER	Individual number assigned to each record.
SITE CODE	Code for each site where systematic fauna surveys were conducted. This field links the Sites and Species tables.
CAVS	Unique code for each species detected (from Census of Australian Vertebrate Species) or code for nil species detected.
GENUS	Genus name.
SPECIES	Species name.
COMMON NAME	Common name.
METHODS	Code for survey methodology used to obtain the record (see attached for key to codes).
EFFORT	Survey effort applied to obtain record.
SEX	Sex of individual.
AGE	Code for age of individual (see attached for key to codes).
WEIGHT	Weight of individual (g).
FOREARM LENGTH	Forearm length (mm) of individual (relevant to microbat species).
REPRODUCTIVE CONDITION	Code for reproductive condition of individual (see attached for key to codes).
NUMBER INDIVIDUALS	Number of individuals detected at each site during survey.
ON SITE?	Whether the species was detected on site (ie. within the 200 x 50m transect area). Yes or No.
RECORD TYPE	Code for record type (see attached for key to codes).
MICROHABITAT CODE	Code for microhabitat individual was detected in (see attached for key to codes).
RELIABILITY	Code for the reliability of the record (see attached for key to codes).
RETRAP	Whether individual was a retrap or not. Yes or No.
COMMENTS	Comments regarding the record (including specimen number, genetic sample number, etc.).

3. Incidental Table

RECORD NUMBER	Individual number assigned to each incidental site.
SITE TYPE	Denoted as INC for Incidental.
TEAM	Team responsible for record.
FIRST DATE	Date of the first day of the survey period.
LAST DATE	Date of the last day of the survey period.
LOCALITY DESCRIPTION	Description of the location of the incidental site.
MAP	Name and/or number of map used.
RESERVE TYPE	SF=State Forest, TR=Timber Reserve, NP=National Park, EP=Environmental Park.
RESERVE NAME	Name of forest reserve where site recorded.
RESERVE NUMBER	Number of forest reserve.
CAVS	Unique code for each species.
GENUS	Genus name.
SPECIES	Species name.
COMMON NAME	Common name.
RECORD TYPE	Code for record type (see attached key).
HABITAT DESCRIPTION	Qualitative description of habitat at the site.
ZONE	Australian Map Grid Zone
AMG EAST	AMG Easting.
AMG NORTH	AMG Northing.
LATITUDE	Latitude in decimal degrees.
LONGITUDE	Longitude in decimal degrees.
OTHER	Comments.

Geographic Extent Name: South East Queensland and Blackdown Tableland

Data currency
Beginning Date: 01 FEB 1997
Ending Date: Current

Dataset status
Progress: In progress
Maintenance & Update Frequency: Continual

Format
Stored Data Formats: DIGITAL Database
Available Format Types: DIGITAL MSACCESS Database

Data quality
Lineage: All information provided in the database was derived from systematic fauna field surveys conducted throughout south east Queensland for the purposes of Comprehensive Regional Assessment.
Scale: Not applicable.
Positional Accuracy: The positional accuracy of all records varies from 0 to 300 metres.
Attribute Accuracy: Data is accurate at time of entry to the best knowledge of the people collecting and entering the data. Database has undergone first round of checking.
Logical Consistency: Not applicable.
Completeness: Data is complete as relevant to CRA timelines.

Contact Information
Contact Organisation: Queensland Department of Environment
Contact Position: Principal Conservation Officer
Contact Person: Teresa Eyre
Mail Address 1:
Suburb:
State:
Country: Australia
Postcode:
Telephone:
Facsimile:
Electronic Mail Address:

Metadata Date
Metadata Date: 30 DEC 1997

Additional Metadata
Additional Metadata: Please refer to the SEQ CRA Systematic Fauna Survey Project report.

Key to codes used in Species and Incidental Tables:

Survey Method Codes

ID	Code	Method
1	SBE	Early morning bird transect
2	SBL	Late morning bird transect
3	SHD	Diurnal Herptofauna transect
4	SHN	Nocturnal Herpetofuana
5	SSP	Hand held spotlighting
6	CVS	Vehicle spotlighting
8	SPT1	Pitfall trapping night 1
9	SSS	Scat searches
10	SPBR	Nocturnal call playback
11	SUH	Standard hand held anabat
12	CUR	Remote anabat
13	STH	Harp trapping
14	CTM	Mistnets
15	CTT	Trip line
16	ION	Incidental sightings on-site
17	IOF	Incidental sightings off-site
18	CAC	Cave or mine search
19	SHA	Hair tubes
20	SET1	Elliott trap night 1
21	SET2	Elliott trap night 2
22	SET3	Elliott trap night 3
23	SET4	Elliott trap night 4
24	STH1	Harp trapping night 1
25	STH2	Harp trapping night 2
26	STH3	Harp trapping night 3
27	STH4	Harp trapping night 4
28	SPT2	Pitfall trapping night 2
29	SPT3	Pitfall trapping night 3
30	SPT4	Pitfall trapping night 4
31	CTU1	Turtle trapping night 1
32	CTU2	Turtle trapping night 2
33	CTU3	Turtle trapping night 3
34	CTU4	Turtle trapping night 4
35	SPBD	Nocturnal call playback dry
36	OUH	Opportunistic hand held anabat
37	OHD	Opportunistic herps diurnal
38	OHN	opportunistic herps nocturnal
39	CAP	BBQ platelet search
40	SPB	Call playback - DNR
41	SPT	pitfalls - DNR
42	SET	Elliotts - DNR

Age Codes

ID	Age	Code
1	Adult	A
2	Sub-adult	S
3	Juvenille	J
4	Tadpole	FP
5	Egg	EG
6	Unknown	U

Reproductive Condition Codes

ID	Reproductive condition	code
1	Teats undeveloped	TU
2	Teats regresses	TR
3	Pregnant	PG
4	Lactating	LA
5	Testes abdominal	TA
6	Testes descended	TDE
7	One dependent yong	Y1
8	Two dependent yong	Y2
9	Post lactating	PL

Record Type Code

ID	Record type	Code
1	Found dead	CF
2	Predated	CP
3	Road kill	CR
4	Detected by other means	D
5	Feeding marks	DF
6	Detected by presences of	DL
7	Nest	DN
8	Pellets	DP
9	Remains (eg: skull)	DR
10	Scats	DS
11	Tracks	DT
12	Heard	H
13	Seen	S
14	Captured/Caught	C
15	Caught by hand	CC
16	Found dead	CF
17	Shot	CS
18	Cast skin	DC
19	Heard after call playback	HT

Reliability Codes

Reliability code	Reliability description
0	Reliability not assigned
1	Specimen with public museum
2	Specimen with other collection
3	Voucher specimen used
4	Reliable or Verified
5	Unverified
6	Unreliable
7	hair/scats definite
8	hair/scats probable
9	hair/scats possible

Microhabitat Codes

ID	Microhabitat	Code
1	Beside building	BB
2	Creek with dry bed	CD
3	Creek with flowing water	CF
4	Channel	CH
5	Drainage ramp	DR
6	In front of mine sharft	FM
7	Tributary	TR
8	Under bridge	UI
9	Walking track	WT
10	In Aquatic vegetation	AV
11	in/on bridge	BR
12	Building	BU
13	Crevice in rock	CK
14	Crevice in log	CL
15	farm/fire dam	DA
16	in dead tree (stag)	DT
17	On sand dune	DU
18	Edge of water	EW
19	in/on post or stump	FC
20	On bare ground	GB
21	On ground (not bare)	GR
22	In Burrow	IB
23	In Cave	IC
24	In Grass	IG
25	In tree hollow	IH
26	In litter	IL
27	In mineshaft/tunnel	IM
28	In reeds	IR
29	In soil	IS
30	In tree	IT
31	In water	IW
32	On (beach) sand	OB
33	On log	OL
34	On rock	OR
35	On road or track	RD
36	Riparian Zone (within 20m)	RZ
37	Shrub	SH
38	In tree which has hollow	TH
39	On trunk	TK
40	Under barkk on tree	UB
41	In undergrowth	UG
42	Under log/fallen wood/bark (natural)	UL
43	Under Rock	UR
44	Under iron/wood pile/other human	UT
45	Waterhole	WH
46	Below canopy	BC
47	Canopy	CA
48	Lower Canopy	LC
49	Mid Canopy	MC
50	Upper Canopy	UC
51	Flying above canopy (overhead)	AC
52	Flying within the canopy	FL
53	High shrub	HS
54	Low shrub	LS
55	Over water	OW
56	Perched	PE
57	Greater than 200 m away	>200

REFERENCES

Abbott, I. 1988, 'Black-chinned Honeyeater, *Melithreptus gularis* (Gould, 1837)', in *Reader's Digest Complete Book of Australian Birds*, eds R. Schodde and S.C. Tidemann, Readers Digest Services, Sydney.

Aitken, P.F. 1983, 'Mammals', in *Natural History of the South East*, eds M.J. Tyler, G.R. Twidale, J.W. Holmes, Royal Society of South Australia.

Allison, F.R. and Hoye, G.A. 1995, 'Eastern Freetail-bat *Mormopterus norfolkensis'*, in *The Mammals of Australia*, ed R. Strahan, Australian Museum and Reed Books, Sydney.

Augee, M.L., Smith, B. and Rose, S. 1996, 'Survival of wild and hand-reared Ringtail Possums (*Pseudocheirus peregrinus*) in bushland near Sydney', *Wildlife Research*, 23: 99-108.

Aumann, T. and Baker-Gabb, D.J. 1991, *The ecology and status of the Red Goshawk in northern Australia*, RAOU Report No. 75, RAOU, Melbourne.

Ayers, D. 1995, 'Little Pied Bat *Chalinolobus picatus*', in *Endangered Fauna of Western New South Wales: Western Region Biodiversity Conservation Project*, N.S.W. National Parks and Wildlife Service.

Barker, J., Grigg, G.C., and Tyler, M.J. 1995, *A field guide to Australian frogs*, Surrey Beatty and Sons, Chipping Norton.

Barry, S.J. 1984, 'Small mammals in a south-east Queensland rainforest: the effects of soil fertility and past logging disturbance' *Australian Wildlife Research*, 11: 31-9.

Biggins, J.G. 1984, 'Communications in possums: a review', in *Possums and Gliders*, eds A.P. Smith and I.D. Hume, Australian Mammal Society, Sydney.

Blakers, M., Davies, S.J.J.F., Reilly, P.N. eds 1984, *The atlas of Australian Birds*, Royal Australasian Ornithologists Union, Melbourne University Press, Melbourne.

Braithwaite, R.W. and Begg, R.J. 1995, 'Northern quoll *Dasyurus hallucatus'*, in *The Mammals of Australia*, ed R. Strahan, Australian Museum and Reed Books, Sydney.

Burnett, S. 1997, 'Colonising cane toads cause population declines in native predators: reliable anecdotal information and management implications', *Pacific Conservation Biology*, 3(1): 65-72.

Calaby, J. 1988, 'Sooty Owl, *Tyto tenebricosa* (Gould, 1845)', in *Reader's Digest Complete Book of Australian Birds*, eds R. Schodde and S.C. Tidemann, Readers Digest Services, Sydney.

Cann, J. and Legler, J.M. 1994, 'The Mary River Tortoise: A New Genus and Species of Short-nected Chelid from Queensland, Australia (Testudines: Pleurodira)', *Chelonian Conservation and Biology*, 1(2): 81-96.

Carrick, F.N. 1995, 'Platypus *Ornithorhynchus anatinus*', in *The Mammals of Australia*, ed R. Strahan, Australian Museum and Reed Books, Sydney.

Catling, P.C. and Burt, R.J. 1994, 'Studies of the ground-dwelling mammals of Eucalypt forest in south-east NSW: the species, their abundance and distribution', *Wildlife Research*, 21: 219-39.

Catling, P.C., Burt, R.J. and Kooyman, R. 1997, 'A comparison of techniques used in a survey of ground-dwelling and arboreal mammals in forest in North-eastern New South Wales', *Wildlife Research*, 24: 417-432.

Chapman, G. 1988, 'Marbled Frogmouth, *Podargus ocellatus* (Quoy and Gaimard, 1830)', in *Reader's Digest Complete Book of Australian Birds*, eds R. Schodde and S.C. Tidemann, Readers Digest Services, Sydney.

Chapman, G. and Clayton, M. 1988, 'Lewin's Rail, *Dryolimnas pectoralis* (Temminck, 1831)', in *Reader's Digest Complete Book of Australian Birds*, eds R. Schodde and S.C. Tidemann, Readers Digest Services, Sydney.

Chrome, F. 1988, 'Yellow-tufted honeyeater *Lichenostomus melanops* (Latham, 1801)' in *Reader's Digest Complete Book of Australian Birds*, eds R. Schodde and S.C. Tidemann, Readers Digest Services, Sydney.

Clancy, T.F. and Close, R.L. 1997, 'The Queensland rock-wallabies - an overview of their

conservation status, threats and management', *Australian Mammology*, 19: 169-74.
Claridge, A.W., Cunningham, R.B. and Tanton, M.T. 1993, 'Foraging patterns of the long-nosed potoroo (*Potorous tridactylus*) for hypogeal fungi in mixed-species and regrowth eucalypt forest stands in south-east Australia', *Forest Ecology and Management*, 61(1-2): 75-90.
Cogger, H. 1996, *Reptiles and Amphibians of Australia*, 5th Edition, Reed Books Australia, Port Melbourne.
Cogger, H.G., Cameron, E.E., Sadlier, R.A. and Eggler, P. 1993, *The Action Plan for Australian Reptiles*, Australian Nature Conservation Agency, Canberra.
Corben, C.J., and Ingram, G.J. 1987, 'A new barred river frog (Myobatrachidae: Mixophyes)', *Memoirs of the Queensland Museum*, 25(1): 233-7.
Corben, C. J. and Roberts, R. 1993, 'Some recent records of the plumed frogmouth *Podargus ocellatus plumiferus*', *The Sunbird*, 23(3): 61-72.
Craig, S.A. 1985, 'Social organisation, reproduction and feeding behaviour of a population of yellow-bellied gliders, *Petaurus australis* (Marsupialia: Petauridae)', *Australian Wildlife Research*, 12: 1-18.
Czechura, G.V. 1978, 'A new locality for *Litoria brevipalmata* (Anura: Pelodryadidae) from southeast Queensland', *Victorian Naturalist*, 95: 150-151.
Czechura, G.V. 1986a, 'Distant exiles: frogs and reptiles recorded from Kroombit Tops, southeast Queensland', *Queensland Naturalist*, 27(1-4): 61-67.
Czechura, G.V. 1986b, 'Kroombit Tops Torrent Frog *Taudactylus pleione*, with a key to the species of *Taudactylus'*, *Queensland Naturalist*, 27(1-4): 68-71.
Czechura, G.V. 1991, 'The Blackall-Conondale Ranges: frogs, reptiles and fauna conservation', in *The Rainforest Legacy*, vol. 2, eds G. Werren and P. Kershaw, Australian Heritage Publication Series, Number 7 (2), AGPS, Canberra.
Czechura, G.V. 1995a, 'Frogs', in *Wildlife of Greater Brisbane*, ed M. Ryan, Queensland Museum, Brisbane.
Czechura, G.V. 1995b, 'Hawks, eagles and falcons', in *Wildlife of Greater Brisbane*, ed M. Ryan, Queensland Museum, Brisbane.
Czechura, G.V. and Ingram, G. J. 1990, '*Taudactylus diurnus* and the case of the disappearing frogs', *Memoirs of the Queensland Museum*, 29: 361-65.
Davey, S. M. 1984, 'Habitat preferences of arboreal marsupials within a coastal forest in southern New South Wales', in *Possums and Gliders*, eds A.P. Smith and I.D. Hume, Australian Mammal Society, Sydney.
Davey, S.M. 1990, 'Methods for surveying the distribution of arboreal marsupials in a South Coast Forest of New South Wales', *Australian Wildlife Research*, 17: 427-45.
Davies, M. and Watson, G.F. 1994, 'Morphology and reproductive biology of - *Limnodynastes salmini, L. convexiusculus* and *Megistolotis lignarius* (Anura: Leptodactylidae: Limnodynastinae)', *Transactions of the Royal Society of South Australia*, 118(3): 149-169
Debus, S. 1995, 'Surveys of large forest owls in northern New South Wales: Methodology, calling behaviour and owl responses', *Corella*, 19(2): 38-50.
Debus, S. 1998, *The Birds of Prey of Australia. A Field Guide to Australian Raptors*, Oxford University Press, Melbourne.
Debus, S.J.S. and Chafer, C.J. 1997, 'The Powerful Owl *Ninox strenua* in New South Wales', *Australian Birds*, 28: 21-38.
Debus, S.J.S. and Czechura, G.V. 1989, 'The Sqare-tailed Kite, *Lophoictina isura*: a review', *Australian Bird Watcher*, 13: 81-97.
Debus, S.J.S. and Rose, A.B. 1994, 'The Masked Owl *Tyto novaehollandiae* in New South Wales', *Australian Birds*, 28: 40-59.
Dennis, A.J. and Johnson, P.M. 1995, 'Rufous Bettong *Aepyprymnus rufescens'*, in *The Mammals of Australia*, ed R. Strahan, Australian Museum and Reed Books, Sydney.
Dickman, C.R. 1995, 'Dusky Antechinus, *Antechinus swainsonii'*, in *The Mammals of Australia*,

ed R. Strahan, Australian Museum and Reed Books, Sydney.
DNR, DoE and EA, 1998, 'Fauna Assessment', in *Response to Disturbance, Threatening Processes and Recovery Planning for Forest Taxa in Southeast Queensland*, eds Queensland Department of Environment, Queensland Department of Natural Resources and Commonwealth Environment Task Force.
Durbidge, E. and Covacevich, J. A. 1981, *North Stradbroke Island*, Stradbroke Island Management Committee, Amity Point.
Dywer, P.D. 1963, 'The breeding biology of *Miniopterus schreibersii blebotis* in north-eastern New South Wales', *Australian Journal of Zoology*, 11: 219-240.
Dwyer, P.D. 1968, 'The biology, origin, and adaptation of *Miniopterus australis* in New South Wales', *Australian Journal of Zoology*, 16: 49-68.
Dwyer, P.D. 1969, 'Population ranges of *Miniopterus schreibersii* (Chiroptera) in south-eastern Australia', *Australian Journal of Ecology*, 17: 665-686.
Dwyer, P.D. 1970, 'Foraging behaviour of the Australian Large-footed Myotis (Chiroptera)', *Mammalia* 34: 76-80.
Dwyer, P.D. 1995a, 'Common Bentwing-bat *Miniopterus schreibersii'*, in *The Mammals of Australia*, ed R. Strahan, Australian Museum and Reed Books, Sydney.
Dwyer, P. D. 1995b, 'Little Bentwing-bat *Miniopterus australis'*, in *The Mammals of Australia*, ed R. Strahan, Australian Museum and Reed Books, Sydney.
Dwyer, P.D. and Hamilton-Smith, E. 1965, 'Breeding caves and maternity colonies of the Bent-wing Bat in south-eastern Australia', *Helictite*, 4: 3-21.
Edgar, R. and Belcher, C. 1995, 'Spotted-tailed Quoll *Dasyurus maculatus*', in *The Mammals of Australia*, ed R. Strahan, Australian Museum and Reed Books, Sydney.
Ehmann, H. 1996a, 'The Wallum Froglet, *Crinia tinnula'*, in *Threatened frogs of New South Wales: Habitats, status, and conservation*, ed H. Ehmann, Frog and Tadpole Study Group of NSW, Sydney.
Ehmann, H. 1996b, 'The Green-thighed Frog, *Litoria brevipalmata'*, in *Threatened frogs of New South Wales: Habitats, status, and conservation*, ed H. Ehmann, Frog and Tadpole Study Group of NSW, Sydney.
Ehmann, H. 1996c, 'The Wallum Sedgefrog, *Litoria olongburensis' in Threatened frogs of New South Wales: Habitats, status, and conservation*, ed H. Ehmann, Frog and Tadpole Study Group of NSW, Sydney.
Eldridge, M.D.B. and Close, R.I. 1995, 'Herbert's Rock Wallaby *Petrogale herberti* Thomas 1926', in *The Mammals of Australia*, ed R. Strahan, Australian Museum and Reed Books, Sydney.
Evans, M. 1996, 'Home ranges and movement schedules of sympatric bridled nailtail and black-striped wallabies', *Wildlife Research*, 23(5): 547-56.
Eyre, T. J. and Schulz, M. 1996, 'Northern range extension of the Powerful Owl *Ninox strenua'*, *Australian Bird Watcher*, 16(7): 296-298.
Eyre, T. J. and Smith, A.P. 1997, 'Floristic and structural habitat preferences of yellow-bellied gliders (*Petaurus australis*) and selective logging impacts in southeast Queensland, Australia', *Forest Ecology and Management*, 98: 281-95.
Flannery, T. 1995a, *Mammals of New Guinea*, Reed Books, Sydney.
Flannery, T. 1995b, *Mammals of the South-west Pacific & Moluccan Islands*, Reed, Sydney.
Forshaw, J. and Cooper, W. 1978, *Parrots of the World*, 2nd edn, Lansdowne, Melbourne.
Fox, B.J., Read, D.G., Jefferys, E. and Luo, J. 1994, 'Diet of the Hastings River Mouse (*Pseudomys oralis*)', *Wildlife Research* 21(5): 491-505.
Frith, H.J. 1988, 'Squatter Pigeon, *Geophaps scripta* (Temminck, 1821)', in *Reader's Digest Complete Book of Australian Birds*, eds R. Schodde and S.C. Tidemann, Readers Digest Services, Sydney.
Garnett, S. 1992, *The Action Plan for Australian Birds.* Australian National Parks and

Wildlife Service, Endangered Species Program, Project No. 121, Canberra.
Gardner, J. L. and Serena, M. 1995, 'Spatial Organisation and Movement Patterns of Adult Male Platypus, *Ornithorhynchus anatinus* (Monotremata: Ornithorrhynchidae)', *Australian Journal of Zoology*, 43: 91-103.
Geiser, F. 1993, 'Hibernation in the eastern pygmy possum, *Cercartetus nanus* (Marsupialia: Burramyidae)', *Australian Journal of Zoology* 41(1): 67-75.
Gilmore, A. and Parnaby, H. 1994, *Vertebrate fauna of conservation concern in north-east NSW Forests*, North East Forests Biodiversity Study Report No. 3e, unpublished report, NSW National Parks and Wildlife Service.
Goldingay, R.L. 1986, 'Feeding behaviour of the yellow-bellied glider *Petaurus australis* (Marsupialia: Petauridae), at Bombala, New South Wales', *Australian Mammalogy*, 9: 17-25.
Goldingay, R.L. 1990, 'Foraging behaviour of a nectar feeding marsupial *Petaurus australis'*, *Oecologia (Berlin)*, 85: 191-99.
Goldingay, R.L. and Kavanagh, R.P. 1991, 'The Yellow-bellied Glider: a review of its ecology, and management considerations', in *Conservation of Australia's Forest Fauna*, ed D. Lunney, Royal Zoological Society of NSW, Mosman.
Griffiths, A.D. and Christian, K.A. 1996a, 'Diet and habitat use of frillnecked lizards in a seasonal tropical environment', *Oecologia (Berlin)*, 106(1): 39-48.
Griffiths, A.D. and Christian, K.A. 1996b, 'The effects of fire on the frillneck lizard (*Chlamydosaurus kingii*) in northern Australia', *Australian Journal of Ecology*, 21(4): 386-98.
Gynther, I.C. 1998, *The Coxen's Fig-Parrot Recovery Plan 1998-2002*, preliminary draft, Department of Environment, Brisbane.
Gynther, I.C. and O'Reilly, P.S. 1995, 'A new locality for Hastings River mouse, *Pseudomys oralis*, in south east Queensland', *Memoirs of the Queensland Museum* 38(2): 513-518.
Hall, L.S. 1995a, 'Black Flying-fox *Pteropus alecto'*, in *The Mammals of Australia,* ed R. Strahan, Australian Museum and Reed Books, Sydney.
Hall, L.S. 1995b, 'Northern Broad-nosed Bat *Scotorepens sanborni'*, in *The Mammals of Australia*, ed R. Strahan, Australian Museum and Reed Books, Sydney.
Hall, L.S. 1995c, 'Semon's Leafnosed-bat *Hipposideros semoni*', in *The Mammals of Australia,* ed R. Strahan, Australian Museum and Reed Books, Sydney.
Hall, L. and Richards, G.C. 1979, *Bats of Eastern Australia*, Queensland Museum Booklet No. 12., Queensland Museum, Brisbane.
Hall, L.S., Richards, G.C. and Spencer, H.J. 1995, 'Eastern tube-nosed bat *Nyctimene robinsoni'*, in *The Mammals of Australia,* ed R. Strahan, Australian Museum and Reed Books, Sydney.
Hamley, T., Flower, P. and Smith, G.C. 1997, 'Present and past distribution Black-breasted Button-quail *Turnix melanogaster* (Gould) in Queensland', *Sunbird*, 27(1): 1-21.
Hannah, D., Agnew, G., Hamley, B., and Hogan, L. 1997, 'New information on the narrowly-restricted skink, *Nangura spinosa*', *Memoirs of the Queensland Museum*, 42(1): 90.
Hartley, S.L. and Kikkawa, J. 1994, *The population management of the Eastern Bristlebird* (Dasyornis brachypterus). Findings on the biology, threats and management of the Eastern Bristlebird in Queensland and northern NSW. Final report to the Department of Environment and Heritage, Queensland; NSW NPWS and the University of Queensland, Brisbane, Queensland.
Hobcroft, D. 1997, 'Sooty Owl *Tyto tenebricosa* at Eungella National Park and Kroombit Tops, Queensland', *Australian Birdwatcher*, 17: 103-104.
Holmes, G. 1989, *Eastern Bristlebird, Species Management Plan for Northern Populations*, draft, Queensland National Parks and Wildlife Service and New South Wales National Parks and Wildlife Sevice.
Holmes, G. 1990, *The Biology and Ecology of Coxen's Fig-Parrot*, RAOU Report No. 65, RAOU, Melbourne.
Horsup, A., James, C. and Porter, G. 1993, Vertebrates of dry rainforest of south and mideastern

Queensland, *Memoirs of the Queensland Museum*, 34(1): 215-228.
Hoye, G.A. 1995, 'Large Forest Bat *Vespadelus darlingtoni*', in *The Mammals of Australia,* ed R. Strahan, Australian Museum and Reed Books, Sydney.
Hoye, G.A. and Dwyer, P.D. 1995, 'Large-eared Pied Bat *Chalinolobus dwyeri*', in *The Mammals of Australia,* ed R. Strahan, Australian Museum and Reed Books, Sydney.
Hume, I.D., Foley, W.J. and Chilcott, M.J. 1984, 'Physiological mechanisms of foliage digestion in the Greater Glider and Ringtail Possum (Marsupialia: Pseudocheiridae)', in *Possums and Gliders,* eds A.P. Smith and I.D. Hume, Australian Mammal Society, Sydney.
Ingram, G.J. and Corben, C.J. 1975, 'The frog fauna of North Stradbroke Island with comments on the "acid frogs" of the wallum', *Proceedings of the Royal Society of Queensland,* 86: 49-54.
Ingram, G.J., Corben, C.J. and Hosmer, W. 1982, '*Litoria revelata*: a new species of tree-frog from eastern Australia', *Memoirs of the Queensland Museum,* 28(2): 475-78.
Ingram, G.J. and McDonald, K.R. 1993, 'An update on the decline of Queensland's frogs', *Herpetology in Australia,* 6: 297-303.
Ingram, G.J. and Raven, R.J. (eds) 1991, *An Atlas of Queensland's frogs, reptiles, birds and mammals,* Queensland Museum, Board of Trustees, Brisbane.
James, C. 1996, *Conservation Genetics of Island and Mainland Populations of the Sedge Frogs* Litoria cooloolensis *and* Litoria olongburensis. A Conservation Research Grant Report for the Queensland Department of Environment and Heritage (Queensland National Parks and Wildlife Service).
Jansen, L. 1987, 'The occurrence of *Myotis adversus* confirmed on the Murray River in South Australia', *Macroderma,* 3: 14-15.
Jarman, P.J. and Bayne, P. 1997, 'Behavioral ecology of *Petrogale pencillata* in relation to conservation', *Australian Mammalogy,* 19: 219-228.
Jarman, P.J. and Capararo, S.M. 1997, 'Use of rock-wallaby faecal pellets for detecting and monitoring populations and examining habitat use', *Australian Mammology,* 19: 257-64.
Jarman, P.J. and Johnson, K.A. 1997, 'Exotic mammals, indigenous mammals and land use', *Proceedings of the Ecological Society of Australia,* 10: 146-166.
Johnson, P.G. 1995, 'Long-nosed potoroo *Potorous tridactylus'*, in *The Mammals of Australia,* ed R. Strahan, Australian Museum and Reed Books, Sydney.
Johnson, P.M. and Vernes, K.A. 1995, 'Red-legged Pademelon *Thylogale stigmatica'*, in *The Mammals of Australia,* ed R. Strahan, Australian Museum and Reed Books, Sydney.
Jolly, S. 1995, 'Common Sheathtail-bat *Taphozous georgianus*', in *The Mammals of Australia,* ed R. Strahan, Australian Museum and Reed Books, Sydney.
Kavanagh, R.P. 1987, 'Forest phenology and its effect on foraging behaviour and selection of habitat by the yellow-bellied glider, *Petaurus australis* Shaw', *Australian Wildlife Research,* 14: 371-84
Kavanagh, R. and Murray, M. 1996, 'Home range, habitat and behaviour of the masked owl *Tyto novaehollandiae* near Newcastle, New South Wales', *Emu* 96: 250-257.
Kehl, J. and Borsboom, A. 1984, 'Home range, den tree use and activity in the Greater Glider, *Petauroides volans'*, in *Possums and Gliders,* eds A. P. Smith and I. D. Hume, Australian Mammal Society, Sydney.
Kemper, C. 1995. 'New Holland Mouse *Pseudomys novaehollandiae*', in *The Mammals of Australia,* ed R. Strahan, Australian Museum and Reed Books, Sydney.
King, D.R. 1989, 'An assessment of the hazard posed to northern quolls (*Dasyurus hallacutus*) by aerial baiting with 1080 to control dingoes', *Australian Wildlife Research,* 16(5): 569-74.
Kirkpatrick, T.H. 1995, 'Black-striped wallaby *Macropus dorsalis'*, in *The Mammals of Australia,* ed R. Strahan, Australian Museum and Reed Books, Sydney.
Kitchener, D.J., Cooper, N. and Maryanto, I. 1995, 'The *Myotis adversus* (Chiroptera: Vespertilionidae) species complex in Eastern Indonesia, Australia, Papua New Guinea and the Solomon Islands', *Records of the Western Australian Museum,* 17(2): 191-212.

Kitchener, D., Jones, B. and Caputi, N. 1987, 'Revision of Australian Eptesicus', *Records of the Western Australian Museum*, 13: 427-500.
Kluge, A.G. 1974, 'A taxonomic revision of the lizard family Pygopodidae', *Miscellaneous Publication of the Museum of Zoology, University of Michigan*, 152: 1-72.
Kutt, A. 1996, 'Bird population density in thinned, unthinned and old lowland regrowth forst, East Gippsland, Victoria', *Emu*, 96: 213-230.
Law, B.S. and Spencer, H.J. 1995, 'Common Blossom-bat *Syconyteris australis'*, in *The Mammals of Australia*, ed R. Strahan, Australian Museum and Reed Books, Sydney.
Liem, D.S. 1973, 'A new genus of frog of the family Leptodactylidae from south-east Queeensland, Australia', *Memoirs of the Queensland Museum*,16: 459-70.
Liem, DS. and Ingram, GJ. 1977, Two new species of frogs (Anura: Myobatrachidae, Pelodryadidae) from Queensland and New South Wales, *Victorian Naturalist* 94(6): 255-62
Loyn, R. 1985, 'Bird populations in successional forests of Mountain Ash, *Eucalyptus regnans*, in Central Victoria', *Emu* 85: 213-230.
Lumsden, L.F. and Bennett, A.F. 1995, 'Large Forest Bat *Vespadelus darlingtoni*', in *Mammals of Victoria*, ed P.W. Menkhorst, Oxford University Press, Melbourne.
Lumsden, L.F. and Menkhorst, P.W. 1995, 'Large-footed Myotis *Myotis adversus'*, in *Mammals of Victoria*, ed P.W. Menkhorst, Oxford University Press, Melbourne.
Lunney, D., Cullis, B. and Eby, P. 1987, 'Effects of logging and fire on small mammals in Mumbulla State Forest, near Bega, New South Wales (Australia)', *Australian Wildlife Research*, 14(2): 163-182.
Magnussen, W.D., Webb, G.J.W. and Taylor, J.A. 1976, 'Two new locality records, a new habitat and a nest description of *Xeromys myoides* Thomas (Rodentia, Muridae)', *Australian Wildlife Research* 3:153-157.
Mahony, M.J. and Knowles, R. 1994, *A taxonomic review of selected frogs of north-east NSW forests.* North East Forests Biodiversity Study Report. No.3b. Report to NSW National Parks and Wildlife Service.
Mahony, M., Knowles, R. and Pattinson, L. 1996, 'The Gold-eyed Barred Frog, *Mixophyes iteratus*', in *Threatened frogs of New South Wales: Habitats, status, and conservation*, ed H. Ehmann, Frog and Tadpole Study Group of NSW, Sydney.
Mansergh, I. 1983, 'The status, distribution and abundance of *Dasyurus maculatus* (Tiger Quoll) in Australia, with particular reference to Victoria', *Australian Zoologist*, 21(2): 109-21.
Marchant, S. and Higgins, P.J. 1993, *Handbook of Australian, New Zealand & Antarctic Birds, Volume 2, Raptors to Lapwings*, Oxford University Press, Melbourne.
Martin, R.W. and Handsyde K.A. 1995 'Koala *Phascolarctos cinereus* ', in *The Mammals of Australia*, ed R. Strahan, Australian Museum and Reed Books, Sydney.
Martin, W.E., McDonald, K.R. and Hines, H.B. 1997, *Recovery plan for* Rheobatrachus silus *and* Taudactylus dirunis, unpublished report to Environment Australia - Biodiversity Group, Canberra.
McCoy, M. 1995, 'Little Red Flying-fox *Pteropus scapulatus'*, in *The Mammals of Australia*, ed R. Strahan, Australian Museum and Reed Books, Sydney.
McDonald K.R. and Davies, M. 1990, 'Morpology and biology of the Australian tree frog *Litoria pearsoniana* (Copland) (Anura: Hylidae)', *Transactions of the Royal Society of South Australia*, 114: 145-56.
McDonald, K.R., Covacevich, J.A., Ingram, G.J. and Couper, P.J. 1991, 'The status of frogs and reptiles' in *An Atlas of Queensland's frogs, reptiles, birds and mammals*, eds G. J. Ingram and Raven, R.J., Queensland Museum Board of Trustees, Queensland Museum, Brisbane.
McGuigan, K., McDonald, K., Parris, K. and Moritz, C. 1998, 'Mitochondrial DNA diversity and historical biogeography of a wet forest-restricted frog (*Litoria pearsoniana*) from mid-east Australia', *Molecular Ecology*, 7, in press.
McKay, G.M. 1995, 'Greater Glider, *Petauroides volans'*, in *The Mammals of Australia*, ed R.

Strahan, Australian Museum and Reed Books, Sydney.
McKay, G.M. and Ong, P. 1995, 'Common Ringtail Possum, *Pseudocheirus peregrinus'*, in *The Mammals of Australia,* ed R. Strahan, Australian Museum and Reed Books, Sydney.
Menkhorst, P.W. and Collier, M. 1987, 'Diet of the Squirrel glider *Petaurus norfolcensis* (Petauridae: Marsupialia) in Victoria', *Australian Mammals*, 11:109-16.
Menkhorst, P.W., Weavers, B.W. and Alexander, J.S.A. 1988, 'Distribution, habitat and conservation status of the squirrel glider *Petaurus norfolcensis* (Petauridae: Marsupialia) in Victoria', *Australian Wildlife Research*, 15(1): 59-71.
Merchant, J.C. 1995, 'Agile Wallaby, *Macropus agilis'*, in *The Mammals of Australia,* ed R. Strahan, Australian Museum and Reed Books, Sydney.
NSW NPWS, 1994, *Fauna of north-east NSW forests*. North East Forests Biodiversity Study, Report Number 3, unpublished report, NSW National Parks and Wildlife Service.
de Oliveira, M.C. and Pavey, C.R. 1995, 'In search of *Hipposideros semoni* at St Mary's State Forest, south-east Queensland', *Australian Bat Society Newsletter*, 4: 46-48.
de Oliveira, M.C. and Schulz, M. 1996, 'Echolocation and roost selection in Semon's Leaf-nosed Bat *Hipposideros semoni'*, *Memoirs of the Queensland Museum*, 42: 158.
Parnaby, H.E. 1986, *A survey of bats of the rainforests of north-east New South Wales,* Report to Australian National Parks and Wildlife Service and New South Wales National Parks and Wildlife Service.
Parnaby, H. 1992, *An Interim Guide to Identification of Insectivorous Bats of South-eastern Australia*. Technical Reports of the Australian Museum, No. 8., Australian Museum, Sydney.
Parnaby, H. 1995a, 'Eastern Cave Bat *Vespadelus troughtoni*', in *The Mammals of Australia,* ed R. Strahan, Australian Museum and Reed Books, Sydney.
Parnaby, H. 1995b, 'Identification criteria and taxonomic clarification of some problematic bat species in north-eastern New South Wales', in *Vertebrates of Upper North East New South Wales*, NSW NPWS, Hurstville.
Parnaby, H. 1998, *The management of bats in timber-production forests of New South Wales*, Report to NSW NPWS, Hurstville, In prep.
Parnaby, H. and Mills, D. 1994, 'A record of the Golden-tipped Bat from the escarpment forests of southern New South Wales', *Australian Zoologist* 29: 245-249.
Pavey, C.R. 1994, 'Records of the food of the powerful owl *Ninox strenua* from Queensland', *Sunbird*, 24(2): 30-39.
Phillips, W. 1995, 'Eastern False Pipistrelle *Falsistrellus tasmaniensis*', in *The Mammals of Australia*, ed R. Strahan, Australian Museum and Reed Books, Sydney.
Phillips, W., Tidemann, C.R., Inwards, S.J. and Winderlich, S. 1985, 'The Tasmanian Pipistrelle: *Pipistrellus tasmaniensis* Gould 1858: annual activity and breeding cycles', *Macroderma* 1: 1.
Pizzey, G. and Knight, F. 1997, *The field guide to the birds of Australia,* HarperCollins Publishers, Sydney.
Poole, M.A. 1994, 'The Hastings River Mouse, *Pseudomys oralis*, from Gambubal State Forest, southeast Queensland', *Memoirs of the Queensland Museum*, 37(1): 280.
Quinn, B.R. and Williamson, R.C. 1996, 'New Holland mouse *Pseudomys novaehollandiae* (Rodentia: Muridae) in South Gippsland, South Victoria: Part two - conservation and management', *Victorian Naturalist*, 113(6): 281-288.
Quinn, D.G. 1995, 'Population Ecology of the Squirrel Glider *(Petaurus norfolcensis*) and the Sugar Glider (*P. breviceps*) (Marsupialia: Petauridae) at Limeburners Creek, on the Central North Coast of New South Wales', *Wildlife Research,* 22: 471-505.
Ramsey, D.S.L. and Wilson, J.C. 1997, 'The impact of grazing by macropods on coastal foredune vegetation in south-east Queensland', *Australian Journal of Ecology*, 22(3): 547-56.
Reardon, T.B. and Flavel, S.C. 1987, *A Guide to the Bats of South Australia*, South Australian Museum and Field Naturalists' Society of South Australia, Adelaide.
Rhind, S.G. 1996, 'Habitat tree requirements and the effects of removal during logging on the

marsupial brush-tailed phascogale (*Phascogale tapoatafa tapoatafa*) Western Australia', *Western Australian Naturalist*, 21(1): 1-22.
Richards, G.C. 1995, 'Little Pied Bat *Chalinolobus picatus*', in *The Mammals of Australia*, ed R. Strahan, Australian Museum and Reed Books, Sydney.
Richards, G.C. and Hall, L.S. 1996, *The Action Plan for Australian Bats*. Draft Report to Australian Nature Conservation Agency, Canberra.
Richards, S.J., McDonald, K.R. and Alford, R.A. 1993, 'Declines in populations of Australia's endemic tropical rainforest frogs', *Pacific Conservation Biology*, 1: 66-77.
Ride, W.D.L. 1970, *A guide to the native mammals of Australia*, Oxford University Press, Melbourne.
Robinson, N. 1988, 'Albert's Lyrebird, *Menura alberti* (Bonaparte, 1850)', in *Reader's Digest Complete Book of Australian Birds*, eds R. Schodde and S.C. Tidemann, Readers Digest Services, Sydney.
Robson, S.K. 1984, '*Myotis adversus* (Chiroptera: Vespertilionidae): Australia's fish-eating bat', *Australian Mammalogy*, 7: 51-52.
Russell R. 1995, 'Yellow-bellied glider *Petaurus australis'*, in *The Mammals of Australia*, ed R. Strahan, Australian Museum and Reed Books, Sydney.
Saunders, D. 1988, 'Glossy Black-Cockatoo, *Calyptorhynchus lathami* (Temminck, 1807)', in *Reader's Digest Complete Book of Australian Birds*, eds R. Schodde and S.C. Tidemann, Readers Digest Services, Sydney.
Schlager, F.E. 1981, *The Distribution and Status of the Rufous Rat-Kangaroo, Aepyprymnus rufescens, and the Long-nosed Potoroo, Potorous tridactylus, in northern New South Wales*, Department of Ecosystems Management, UNE Armidale. Project Report No 18.
Schodde, R. and Mason, I.J. 1980, *Nocturnal birds of Australia*, Lansdowne, Melbourne.
Schulz, M. 1983, 'Nesting of the Square-tailed Kite in south-eastern New South Wales', *Australian Birds*, 18: 6-8.
Schulz, M. 1994a, *Fauna of Kroombit Tops State Forest*, Internal Report, Department of Primary Industries (Forestry), Brisbane.
Schulz, M. 1994b, *The vertebrate fauna (excluding fish) of the northern section of the Pumistone Passage*, Report to the South-eastern Region, Department of Environment, Brisbane.
Schulz, M. 1995a, *A preliminary investigation of the Golden-tipped Bat* Kerivoula papuensis *in the Wet Tropics, north-eastern Queensland*, Report to the Wet Tropics Management Authority, Cairns.
Schulz, M. 1995b, 'Utilisation of suspended bird nests by the Golden-tipped Bat (*Kerivoula papuensis*) in Australia', *Mammalia*, 59: 280-283.
Schulz, M. 1997, 'The Little Bent-wing Bat *Miniopterus australis* roosting in a tree hollow', *Australian Zoologist*, 30(3): 329.
Schulz, M. 1998, 'Bats and other fauna in disused Fairy Martin *Hirundo aerial* (Hirundinidae) nests', *Emu*, in press.
Schulz, M. in prep., 'Roost selection in the Golden-tipped Bat *Kerivoula papuensis* (Chiroptera: Vespertilionidae) in Australia'.
Schulz, M. and de Oliveira, M.C. 1995, 'Microchiropteran fauna of Kroombit Tops, central Queensland, including a discussion on survey techniques', *Australian Zoologist*, 30(1): 71-77.
Schulz, M. and Eyre, T.J. 1997, 'New distribution and habitat data for the Pygopodid *Paradelma orientalis* (Günther, 1876)', *Memoirs of the Queensland Museum*, 42(1): 212.
Schulz, M., deOliveira, M.C. and Eyre, T. 1994, 'Notes on the Little Pied Bat *Chalinolobus picatus* in Central Queensland', *Queensland Naturalist*, 33: 35-38.
Seebeck, J.H., Bennet, A.F. and Scotts, D.J. 1989, 'Ecology of the *Potoroidae* - a review', in *Kangaroos, Wallabies and Rat Kangaroos*, eds G. Grigg, P. Jarman, and I. Hume, Australian Mammal Society and Surrey Beatty and Sons, Sydney.

Shine, R. 1981, 'Ecology of Australian elapid snakes of the genera *Furina* and *Glyphodon*', *Journal of Herpetology*, 15(2): 219-224
Shine, R. and Lambeck, R. 1989, 'Ecology of frill-necked lizards, *Chlamydosaurus kingii* (Agamidae), in tropical Australia', *Australian Wildlife Research*, 16(5): 491-500.
Short, J. 1989, 'The diet of the brush-tailed rock-wallaby in New South Wales', *Australian Wildlife Research*, 16:11-18.
Short, J. and Milkouits, G. 1990, 'Distribution and status of the Brush-tailed Rock-wallaby in south-eastern Australia', *Australian Wildlife Research*, 17: 169-179.
Smith, G.C., Hamley, B.J., Park, K.M. and Kehl, J.C. 1994, 'Home range of the Plumed Frogmouth *Podargus occellatus plumiferus* during the non-breeding season as shown by radio tracking', *Emu*, 94(2): 134-137.
Smith, G.T. 1988, 'Rufous Scrub-bird, *Atrichornis rufescens* (Ramsay, 1867)', in *Reader's Digest Complete Book of Australian Birds*, eds R. Schodde and S.C. Tidemann, Readers Digest Services, Sydney.
Soderquist, T. 1995, 'Brush-tailed Phascogale *Phascogale tapoatafa*', in *The Mammals of Australia*, ed R. Strahan, Australian Museum and Reed Books, Sydney.
Stewart, F. 1988, 'Regent Honeyeater, *Xanthomyza phrygia* (Shaw, 1794)', in *Reader's Digest Complete Book of Australian Birds*, eds R. Schodde and S.C. Tidemann, Readers Digest Services, Sydney.
Storr, G.M. 1973, 'List of Queensland birds', *Special Publications of the Western Australian Museum*, 5: 1-177.
Strahan, R. (ed) 1995, *The Mammals of Australia*, The Australian Museum and Reed Books, Sydney.
Straughan, I.R. 1968, 'A taxonomic review of the genus *Mixophyes*, (Anura, Leptodactylidae)', *Proceedings of the Linean Society of New South Wales*, 93(1): 52-59.
Suckling, G.C. 1995, 'Squirrel glider *Petaurus norfolcensis*', in *The Mammals of Australia*, ed R. Strahan, Australian Museum and Reed Books, Sydney.
Tidemann, C.R. 1988, 'A survey of the mammal fauna of the Willandra Lakes World Heritage region, New South Wales', *Australian Zoologist*, 24: 197-204.
Tideman, C.R. 1995a, 'Grey-headed Flying-fox *Pteropus poliocephalus*', in *The Mammals of Australia*, ed R. Strahan, Australian Museum and Reed Books, Sydney.
Tideman, C.R. 1995b, 'Southern Forest Bat *Vespadelus regulus*', in *The Mammals of Australia*, ed R. Strahan, Australian Museum and Reed Books, Sydney.
Tideman, C.R. 1995c, 'Little Forest Bat *Vespadelus vulturnus*', in *The Mammals of Australia*, ed R. Strahan, Australian Museum and Reed Books, Sydney.
Traill, B.J. and Coates, T.D. 1993, 'Field observations on the Brush-tailed Phascogale *Phascogale tapoatafa* (Marsupialia: Dasyuridae)', *Australian Mammology*, 16: 61-65.
Turner, V.T. and Ward, S.J. 1995, 'Eastern Pygmy-possum *Cercartetus nanus*', in *The Mammals of Australia*, ed R. Strahan, Australian Museum and Reed Books, Sydney.
Van Dyck, S. 1995a. 'False Water-rat *Xeromys myoides*', in *The Mammals of Australia*, ed R. Strahan, Australian Museum and Reed Books, Sydney.
Van Dyck, S. 1995b, 'Monotremes and Marsupials'. in *Wildlife of Greater Brisbane*, ed M. Ryan, Queensland Museum, Brisbane.
Van Dyck, S. 1996a, *Pebble-mound mice*, Pseudomys patrius *and* Pseudomys sp. *(Rodentia: Muridae), in Queensland*, Final report to the Australian Nature Conservaton Agency. Queensland Museum, Brisbane.
Van Dyck, S. 1996b, '*Xeromys myoides* Thomas, 1889 (Rodentia: Muridae) in mangrove communites of North Stradbroke Island, southeast Queensland', *Memoirs of the Queensland Museum*, 42(1): 337-366.
Van Dyck, S. and Lawrie, B. 1997, 'The New Holland mouse *Pseudomys novaehollandiae* (Rodentia: Muridae), an addition to the mammal fauna of Queensland', *Memoirs of the*

Queensland Museum 42(1): 367-376.
Van Dyck, S. and Ogilvie, P. 1977, '*Antechinus swainsonii* (Waterhouse, 1840). The dusky marsupial mouse, an addition to the mammal fauna of Queensland', *Memoirs of the Queensland Museum*, 18: 69-73.
Vernes, K. 1995, 'The diet of the red-legged pademelon *Thylogale stigmatica* (Gould) (Marsupialia: Macropodidae) in fragmented tropical rainforest, north Queensland, Australia', *Mammalia*, 59(4): 517-525.
Vernes, K., Marsh, H. and Winter, J. 1995, 'Home-range characteristics and movement patterns of the red-legged pademelon (*Thylogale stigmatica*) in a fragmented tropical rainforest', *Wildlife Research*, 22(6): 699-708.
Watt, A. 1993, *Conservation status and draft management plan for* Dasyurus maculatus *and* D. hallucatus *in Southern Queensland*, Internal report to the Queensland Department of Environment and Heritage and The Commonwealth Department of the Environment, Sport and Territories.
Wilson, B.A. 1991, 'The ecology *of Pseudomys novaehollandiae* (Waterhouse, 1843) in the Eastern Otway Ranges, Victoria (Australia)', *Wildlife Research* 18(2): 233-248.
Wilson, S.K. and Czechura, G.V. 1995, 'Lizards', in *Wildlife of Greater Brisbane*, ed M. Ryan, Queensland Museum, Brisbane.
Wilson, S.K. and Knowles, D.G. 1988, *Australia's Reptiles*, Collins Publishers, Sydney.
Woodside, D.P. 1995, 'Golden-tipped Bat *Kerivoula papuensis*', in *The Mammals of Australia*, ed R. Strahan, Australian Museum and Reed Books, Sydney.
Young, P.A.R. 1998, 'Southeast Queensland', in *Conservation Status of Queensland's Bioregional Ecosystems*, eds P.S. Sattler and R.D. Williams, Conservation Technical Report, Department of Environment, Brisbane.
Young, R.A. and Ford, G.I. in press, 'Range extension of the little forest bat *Vespadelus vulturnus* (Chiroptera: Vespertilionidae) into a semi-arid area of central Queensland, Australia', *Australian Zoologist*.

GLOSSARY

ABBRIEVIATIONS

AMG	Australian Map Grid
CRA	Comprehensive Regional Assessment
DNR	Department of Natural Resources (Queensland)
DoE	Department of Environment (Queensland)
FAU	Forest Assessment Unit
EA	Environment Australia
GPC	Greater Planning Certainty
GPS	Global Positioning System
NP	National Park
QNPWS	Queensland National Parks and Wildlife Service
SEQ	South-east Queensland
SF	State Forest
TOF	Tall Open Forest
TR	Timber Reserve