IV Vertebrate Fauna

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Introduction

The vertebrate fauna of the Lake Johnston-Hyden Study Area is poorly known. The area is east of the region considered by Chapman and Dell (1985) in their examination of the biology and zoogeography of the wheatbelt herpetofauna and, apart from a few papers (e.g. Whitlock 1937; Carnaby 1933, 1938) which deal with the periphery of the Study Area, there are no published avifaunal data. Except for a catalogue (Kitchener and Vicker 1981) which includes the few opportunistically collected specimens, the mammal fauna is also poorly documented.

The vertebrate fauna of the Lake Johnston-Hyden Study Area was documented by intensive sampling within four main survey areas and opportunistic collection at other locations. The basis for selection of the four survey areas varied considerably.

The Lake Cronin (LC) survey area had been identified as a unique semi-arid wetland (Conservation Through Reserves Committee, 1974) and recommended as a conservation reserve. The sampling sites chosen within the Lake Cronin survey area (Table 5) cover the major landforms and vegetation types within a 15 km radius of this unique freshwater, semipermanent lake. The Lake Cronin survey area is located in the Roe Botanical District of the South-west Botanical Province (Beard 1980) and its vegetation types mapped in detail (Figure 4) during this survey by Newbey.

The McDermid Rock (MR) survey area was selected on the basis of its location in the north-east of the Study Area. As such it has vegetation formations characteristic of the Coolgardie Botanical District of the Eremaean Botanical Province. Four landforms and numerous vegetation types were sampled (Table 6).

The selection of Frank Hann (FH) and Peak Charles (PC) National Parks was made in order to document the fauna within the two principal conservation areas of the Study Area. The former had been gazetted prior to the commencement of this study and the latter during this study. These National Parks encompass several landforms (Figure 2) and a variety of vegetation types (Tables 7, 8). They are situated within the Roe Botanical District.

The vertebrate sampling methods have been detailed by the Biological Surveys Committee (1984). Intensive sampling by fenced pitfall traplines, metal traplines and observation quadrats was undertaken for at least five days during each survey period at a minimum of 5 sample sites in each of the four survey areas. Opportunistic sampling and observations were made at numerous other sites. Sample sites were selected to cover the major vegetation types within the survey area, irrespective of their extent, and as many landforms as practicable. Other sites were chosen to supplement data from sample sites either by rep-

Table 5 Fauna Sites of the Lake Cronin Survey Area (LC)

Site No.	Field No.(LC)	Site Co-ordinates Latitude	Longitude	Vegetation	Site Type	Fauna Survey FP 123	TL 123	BQ 123	OP 123
HILL, BANDED IRONSTONE FORMATION (HI)									
LH11		32 21 15	119 38 55	Banded Ironstone Formation	O	...	...	...	XXX
SALT LAKE FEATURES (L)									
LH14a		32 22 10	119 45 40	*Halosarcia* Low Shrubland	O	...	...	...	XXX
SANDPLAIN (S)									
LH27a	M3 R3 B4	32 23 15	119 41 10	*Hakea* cf. *falcata* Low Shrubland	S	XXX	XXX	XXX	XXX
UNDULATING PLAIN, GREENSTONE (UN)									
LH28a	M9	32 21 15	119 45 00	*Eucalyptus flocktoniae* Low Woodland	S	...	X..	...	X.X
BROAD VALLEY (V)									
LH33a	M7 B3	32 24 45	119 45 10	*Eucalyptus longicornis* Open Woodland	S	...	XXX	XXX	XXX
LH34	M1 R1	32 23 00	119 45 20	*Eucalyptus salmonophloia* Open Woodland	S	XXX	XXX	...	XXX
LH41	B1	32 23 45	119 44 50	*Eucalyptus cylindrocarpa* Mallee	S	...	...	XXX	XXX
LH41a	M4 R4 B2	32 23 30	119 44 35	*Eucalyptus cylindrocarpa* Mallee	S	XXX	XXX	XXX	XXX
LH43	R7	32 22 15	119 49 30	*Eucalyptus leptophylla* Mallee	S	.XX	X..	...	XXX
LH43a	R8	32 22 30	119 49 35	*Eucalyptus leptophylla* Mallee	S	.XX	.XX	...	XXX
LH43b	M5 R5	32 23 15	119 45 00	*Eucalyptus leptophylla* Mallee	S	XXX	XXX	...	XXX
LH46	M6 R6 B5	32 23 15	119 41 10	*Eucalyptus pileata* Mallee	S	XXX	XXX	XXX	XXX
LH47	M2 R2	32 23 10	119 45 05	*Eucalyptus scyphocalyx* Mallee	S	XX.	XX.	...	XXX
LH50		32 22 50	119 45 30	*Melaleuca* aff. *preissiana* Tall Shrubland	O	...	...	...	XXX

Field No.: M = mammal, R = reptile, B = bird. Site Type: O = other site, S = sample site. Fauna Survey: FP = Fenced pitline, TL = Trapline, BQ = Bird quadrat, OP = Opportunistic sightings; numbers indicate period of survey: 1 = 1st survey (September 1979), 2 = 2nd survey (April 1980), 3 = 3rd survey (November-December 1981). Site numbers ending with a lower case letter differ from typical vegetation sites. Their descriptions and differences are presented in Appendix III.

lication or by examining minor vegetation types. The relationship between landform, vegetation and sites within each survey area are detailed in Tables 5-8.

Frank Hann and Peak Charles National Parks were surveyed during March 1980, November 1980 and September 1981. Representative specimens of amphibians and reptiles were collected and lodged in the Western Australian Museum as R69852-874, 69928-972 and 70704-714 (March), R78325-471 (November) and R78820-880 (September); representative mammal specimens are lodged as M17997-18000 and M20001-034 (March), M24112-133 and 24152-170 (November) and M24181-188 (September).

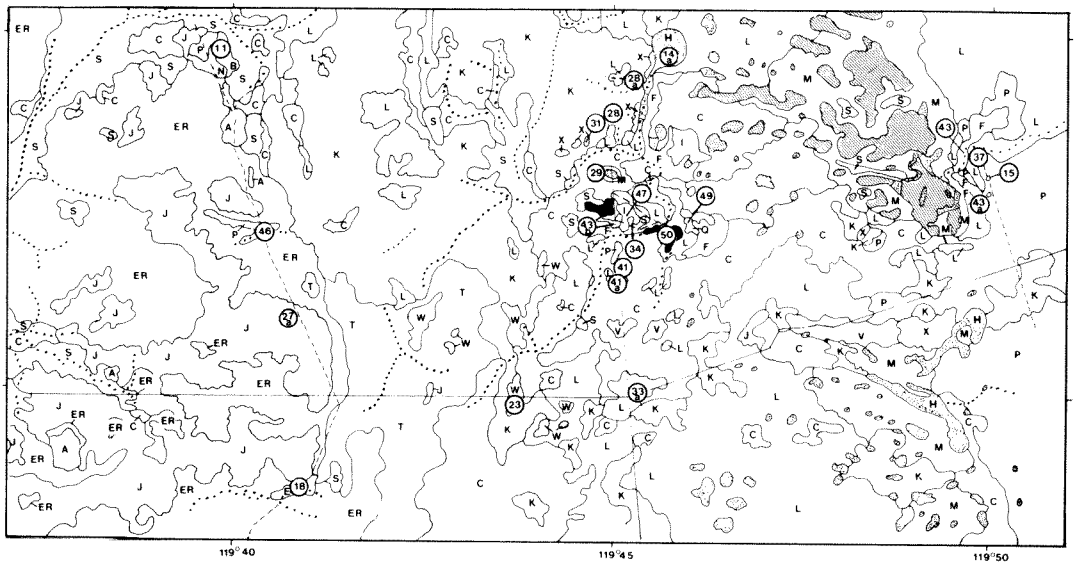

Figure 4 Map showing the distribution of vegetation types and location of fauna sample sites in the Lake Cronin survey area. The number in brackets is the LH number for description of vegetation type. Those not followed by a lower case letter are listed in Appendix I; with a lower case letter in Appendix III. A—*Acacia sessilispica* Tall Shrubland (7), B—Banded Ironstone Formation Complex (11), C—*Eucalyptus cylindricarpa* Mallee (41, 41a), E—*E. eremophila* var. *eremophila* Mallee (18), ER—*E. redunca* Mallee (19), F—*E. leptophylla* Mallee (43, 43a, 43b), G—*E. georgei* Low Woodland (15), H—*Halosarcia* Low Shrubland (14) is stippled, I—*E. scyphocalyx* Mallee (47), J—*Hakea* aff. *falcata* Low Shrubland (27), K—*E. flocktoniae* Low Woodland (28), L—*E. longicornis* Woodland (33), intermixed with Low Woodland (37), M—*E. myriadena* Low Woodland (29), N—*Allocasuarina campestris* ssp. *campestris* Tall Shrubland (8), P—*E. pileata* Mallee (46), Q—*Acacia jennerae* Tall Shrubland (49), R—E. *salubris* Low Woodland (38), S—E. *salmonophloia* Woodland (34), T—E. *transcontinentalis* Mallee (21), V—E. *transcontinentalis* Low Woodland (40), W—*Acacia signata* Tall Shrubland (23), X—Greenstone Complex (31), O—*Melaleuca* aff. *preissiana* Tall Shrubland (50) is shaded black—Bare salt lake floor is cross-hatched.

Table 6 Fauna Sites of McDermid Rock Survey Area (MR)

Site No.	Field No.(MR)	Site Co-ordinates Latitude	Longitude	Vegetation	Site Type	Fauna Survey FP 123	TL 123	BQ 123	OP 123
GRANITE EXPOSURE (G)									
LH10a	M7	32 01 15	120 44 05	Granite Complex	S	..	XXX		XXX
LH5	R5	32 01 30	120 44 30	*Eucalyptus loxophleba* Mallee	S	XXX	XXX		XXX
LH8	M3 R3 B3	32 02 55	120 42 40	*Allocasuarina campestris* ssp. *campestris* Tall Shrubland	S	XXX	XXX	XXX	XXX
SALT LAKE FEATURES (L)									
LH9a	M1 R1 B1	32 00 45	120 45 50	*Melaleuca uncinata* Tall Shrubland	S	XXX	XXX	XXX	XXX
SANDPLAIN (S)									
LH8c	M2 R2 B4	32 03 20	120 42 20	*Allocasuarina campestris* ssp. *campestris* Tall Shrubland	S	XXX	XXX	XXX	XXX
BROAD VALLEY (V)									
LH33	B6	32 01 30	120 45 25	*Eucalyptus longicornis* Open Woodland	S	.	XXX	XX	XXX
LH34a	M4 R4 B5	32 01 40	120 44 45	*Eucalyptus salmonophloia* Open Woodland	S	XXX	XXX	XXX	XXX
LH38	B2	32 01 00	120 45 40	*Eucalyptus salubris* Low Woodland	S	...		XXX	XXX
LH38a	M6 R6	32 01 00	120 45 25	*Eucalyptus salubris* Low Woodland	S	XXX	XXX		XXX

See Table 5 for explanation of symbols.

Table 7 Fauna Sites of Frank Hann National Park (FH)

Site No.	Field No. (FH)	Site Co-ordinates Latitude	Longitude	Vegetation	Site Type	Fauna Survey FP 123	TL 123	BQ 123	OP 123
GRANITE COMPLEX (G)									
LH10b		32 59 30	120 01 55	Granite Complex	O	...	. .	. .	XXX
SALT LAKE FEATURES (L)									
LH18a		32 56 05	120 20 00	*Eucalyptus eremophila* Mallee	O	..			XXX
SANDPLAIN (S)									
LH17	M2 R2 B2	32 48 45	120 30 30	*Eucalyptus* aff. *decipiens* Mallee	S	X.	X	X .	X
LH19a	M6 R6 B6	32 59 30	120 06 20	*Eucalyptus redunca* Mallee	S	XX	.XX	XX	XX
LH21	M4 R4 B4	32 59 30	120 02 55	*Eucalyptus transcontinentalis* Mallee	S	XXX	XXX	XXX	XXX
LH21	M1 R1 B1	32 41 25	120 40 30	*Eucalyptus transcontinentalis* Mallee	S	X..	X	X .	X
LH27	M5 R5 B5	32 02 12	119 58 05	*Hakea* aff. *falcata* Low Shrubland	S	XXX	XXX	XXX	XXX
BROAD VALLEY (V)									
LH34b	M3 R3 B3	32 56 30	120 20 30	*Eucalyptus salmonophloia* Open Woodland	S	XXX	XXX	XXX	XXX
LH46a		32 53 12	120 24 10	*Eucalyptus pileata* Mallee	S				XXX
LH21a	M7 R7 B7	32 59 30	120 08 50	*Eucalyptus transcontinentalis* Mallee	S	.XX	XX	XX	XX
LH50a		33 02 15	119 59 30	*Melaleuca* aff. *preissiana* Tall Shrubland	O	...	.		XXX

See Table 5 for explanation of symbols.

Table 8 Fauna Sites of Peak Charles National Park (PC)

Site No.	Field No. (PC)	Site Co-ordinates Latitude	Longitude	Vegetation	Site Type	Fauna Survey FP 123	TL 123	BQ 123	OP 123
GRANITE EXPOSURE (G)									
LH9	M2 R2 B2	32 54 40	121 10 10	*Melaleuca uncinata* Tall Shrubland	S	XXX	XXX	XXX	XXX
HILL, GRANITE (HG)									
LH3a	M1 R1 B1	32 52 30	121 09 50	*Allocasuarina huegeliana* Low Woodland	S	XXX	XXX	XXX	XXX
LH8a		32 57 20	121 08 50	*Allocasuarina campestris* ssp. *campestris* Tall Shrubland	O		.	. .	XXX
LH8b		32 52 30	121 09 30	*Allocasuarina campestris* ssp. *campestris* Tall Shrubland	O		.	.	XXX
SALT LAKE FEATURES (L)									
LH13a		32 55 10	121 03 00	*Atriplex vesicaria* ssp. *variabilis* Low Shrubland	O		...	...	XXX
BROAD VALLEY (V)									
LH45a	M3 R3 B3	32 55 00	121 08 50	*Eucalyptus incrassata* Mallee	S	XXX	XXX	XXX	XXX
LH20a	M5 R5 B5	32 53 55	121 07 25	*Eucalyptus tetragona* Mallee	S	XXX	XXX	XXX	XXX
LH34c	M4 R4 B4	32 55 30	121 07 45	*Eucalyptus salmonophloia* Open Woodland	S	XXX	XXX	XXX	XXX

See Table 5 for explanation of symbols.

Lake Cronin and McDermid Rock survey areas were surveyed during September 1978, July 1979 and February 1981 with an additional brief trip being undertaken to Lake Cronin in November 1979. Specimens of amphibians and reptiles are lodged in the Museum as R65096-366 (September), R66072-181 (July) R68001-091 (November) and R74101-345 (February); mammals are lodged as M17501-522 and 17536-537 (September), M17633-687 (July), M17767-779 (November) and M20078-134 (February).

Nomenclature used in this report follows Storr's (unpubl.) checklist of amphibians and reptiles in Western Australia, Storr and Johnstone (1985) for birds, and Strahan (1983) for mammals.

Amphibians and Reptiles

The three year survey of the Study Area documented the presence of 9 amphibian and 54 reptile species. The number of individuals recorded in each sample site of the four survey areas are presented in Tables 9 and 10.

Lake Cronin has by far the richest frog community recorded in the Eastern Goldfields; this is undoubtedly related to the lake itself, being both freshwater and semipermanent. Two winter-breeeding species, *Helioporous albopunctatus* and *Limnodynastes dorsalis* are at the inland extremes of their distributions, while the summer-breeding morphologically similar *Neobatrachus centralis* and *N. sutor* are close to their southern limits. Breeding usually occurs in winter in *Ranidella pseudinsignifera* but at Lake Cronin this species breeds in summer (Main 1965), while *Pseudophryne occidentalis* probably breeds opportunistically (Tyler *et al.* 1984). Recent work on *Neobatrachus* in south-western Australia has suggested that most *N. centralis* in the region are referable to *N. kurrapalari* (Mahony and Roberts 1986).

The turtle frog *Myobatrachus gouldii* was collected at Frank Hann and Peak Charles National Parks in several habitats and heard calling in others just after rain during the August 1981 trip. These areas represent the north-eastern inland extremes of this endemic south-western Australian species. Another south-western species, *Pseudophryne guentheri,* is at the edge of its distribution at Frank Hann National Park and is replaced by its arid zone congener *P. occidentalis* at the other three survey areas.

The elapid snake *Denisonia atriceps* (Storr 1980) is known only from the Lake Cronin area, the holotype being collected during the period of survey.

The relatively sharp south-west to north-east rainfall gradient across the Study Area and the consequent transition from the South-west Botanical Province to the Eremaean Botanical Province has a marked effect on the distributions of numerous reptiles. This is exemplified by replacements of several ecologically similar species between the southern and western survey areas and the north-eastern survey area. Species with ranges based on the south-west, such as *Diplodactylus spinigerus, Ctenotus impar* and *Lerista distinguenda* are replaced at McDermid Rock by their arid zone counterparts *D. intermedius, C. xenopleura* (a species discovered in and restricted to the Eastern Goldfields) and *L. muelleri.*

Table 9 Amphibians and reptiles at Lake Cronin (LC) and McDermid Rock (MR) survey areas indicating number of species and individuals caught in each sample site. The first figure indicates the number caught in fenced pit lines; the second figure indicates the number caught opportunistically; single figures indicate opportunistic collecting only. Numbers for the three survey periods are combined. Vegetation types are listed in Tables 5 and 6 and described in Appendix III.

	LAKE CRONIN													McDERMID ROCK							
Landform Unit	**HI**	**L**	**S**	**V**	**V**	**V**	**V**	**V**	**V**	**V**	**V**	**V**	**V**	**G**	**G**	**G**	**L**	**S**	**V**	**V**	**V**
Vegetation Code (LH)	**11**	**14a**	**27a**	**33a**	**34**	**41**	**41a**	**43**	**43a**	**43b**	**46**	**47**	**50**	**10a**	**5**	**8**	**9a**	**8c**	**33**	**34a**	**38a**
LEPTODACTYLIDAE																					
Heleioporus albopunctatus											0/1										
Limnodynastes dorsalis					0/1								5								
Neobatrachus centralis							1/0			1/0		1/0	1	4		3/0	5/0	7/0			
N. pelobatoides					0/1		1/0							4				1/0			
N. sutor					2/10		2/0			1/0		0/1									
Pseudophryne occidentalis	2	2		1										6						1/0	
Ranidella pseudinsignifera	2												10								
GEKKONIDAE																					
Crenadactylus o.ocellatus	1	1		5			0/3						2	13	1/0	0/3				0/2	
Diplodactylus granariensis				5																0/4	
D. intermedius																0/1		0/2			
D. maini				18	1/21		0/1		4/0		1/2						1/0			6/2	1/0
D. pulcher																0/2					2/0
D. spinigerus	2		0/3																		
Gehyra variegata	1			8	0/8	2	0/1	0/1					4	6	0/2	0/1		0/1		1/0	5/1
Heteronotia binoei														7	1/0	0/1		0/1			0/1
Oedura reticulata				6	0/5															0/1	1/12
Phyllodactylus m.marmoratus																					1/0
Phyllurus milii	3													3							
PYGOPODIDAE																					
Delma fraseri					0/1					0/1	0/2					0/1			1		
Lialis burtonis				1		1	0/1			1/0	0/1										
Pygopus lepidopodus															3/1	0/1		0/1			
AGAMIDAE																					
Ctenophorus cristatus				11	1/3		0/3	0/1	1/1			0/1	6		1/2	0/2			2	0/4	2/5
C. isolepis citrinus																		0/2			
C. maculatus griseus		1	0/9						0/4	2/1	2/9							0/1			
C. ornatus														19		0/2					
C. salinarum		10					0/1						1				7/5				
Moloch horridus				1			0/1									0/1				0/1	1/0
Pogona m.minor				2	0/1			0/1	1/2	1/1	0/1	0/2	1		1/0	0/1		0/2		0/1	
Tympanocryptis adelaidensis chapmani			10/1								2/1										
SCINCIDAE																					
Cryptoblepharus plagiocephalus				2						0/1			2							0/2	
Ctenotus atlas								5/0	15/0	2/0								1/2			
C. impar			6/3								2/4										

Table 9 (Contd.)

	LAKE CRONIN													McDERMID ROCK							
Landform Unit	**HI**	**L**	**S**	**V**	**V**	**V**	**V**	**V**	**V**	**V**	**V**	**V**	**V**	**G**	**G**	**G**	**L**	**S**	**V**	**V**	**V**
Vegetation Code (LH)	**11**	**14a**	**27a**	**33a**	**34**	**41**	**41a**	**43**	**43a**	**43b**	**46**	**47**	**50**	**10a**	**5**	**8**	**9a**	**8c**	**33**	**34a**	**38a**
SCINCIDAE (Contd.)																					
C. schomburgkii				1	8/0	1	1/1		0/1	1/0		1/0				0/1					2/0
C. xenopleura																		3/0			
Egernia richardi				2	0/1															0/1	0/1
E. inornata																2/1		2/4			
E. multiscutata bos								1/0	0/1		0/1				2/6	1/1		0/1		0/1	
Hemiergis i.initialis				1															1		0/6
Lerista distinguenda				1					1/0												
L. muelleri															1/3		1/1		3	0/1	2/15
L. p.picturata															1/13		0/2		1	0/1	0/1
Menetia greyii						1			1/0				2		1/1		0/1	1/0			1/0
Morethia butleri				4		11	0/1						1		0/2						0/3
M. obscura				3	1/3	5	3/7		1/1	3/1		0/2			1/2						
Omolepida branchialis		1				1		1/0										0/2			
Tiliqua occipitalis				1																	
T. rugosa														2		0/1		0/1			0/1
VARANIDAE																					
Varanus gouldii									0/1	1/0				1							
TYPHLOPIDAE																					
Ramphotyphlops australis				1											1/0						
ELAPIDAE																					
Denisonia atriceps					0/1																
Pseudechis australis				1																	
Pseudonaja affinis			0/1														0/1				
P. modesta																0/1					
Rhinoplocephalus gouldii							0/1				0/1										
Vermicella bertholdi															0/1						
V. bimaculata				2											0/2						
V. semifasciata																		0/1			
No. of species	6	5	5	21	13	7	14	6	11	11	10	6	11	10	15	17	7	17	5	14	16
Pit nights			336		200		190	150	198	278	150	100			340	165	300	306		240	170

Table 10 Amphibians and reptiles at Frank Hann (FH) and Peak Charles (PC) National Park Survey areas. Data are listed in same format as Table 9. Vegetation types are lised in Tables 7 and 8 and described in Appendix III.

	Frank Hann									Peak Charles					
Landform Unit	**G**	**L**	**S**	**S**	**S**	**S**	**S**	**V**	**V**	**G**	**HG**	**L**	**V**	**V**	**V**
Vegetation Code (LH)	**10b**	**18a**	**17**	**19a**	**21**	**21**	**27**	**34b**	**21a**	**9**	**3a**	**13a**	**45a**	**20a**	**34c**
LEPTODACTYLIDAE															
Heleioporus albopunctatus					0/1										
Limnodynastes dorsalis					0/1									2/0	
Myobatrachus gouldii			1/0											2/6	1/0
Neobatrachus sp.	1		1/0	0/1							0/1				
Pseudophryne occidentalis										1/0	0/1				
P. guentheri				0/1											
GEKKONIDAE															
Crenadactylus o.ocellatus										0/1	0/2				1/1
Diplodactylus granariensis				2/0	1/1	1/0		1/6	4/0	1/0			2/0		1/7
D. maini		1		1/0	1/0			5/5	4/0	6/3					
D. spinigerus				2/0	0/1										
Gehyra variegata						0/1		0/3		1/4	0/3				0/1
Oedura reticulata								1/3							1/0
Phyllodactylus m.marmoratus	1														
PYGOPODIDAE															
Lialis burtonis														1/0	
Pygopus lepidopodus															0/1
AGAMIDAE															
Ctenophorus cristatus		1				1/0		1/6			0/1				1/5
C. maculatus griseus		2	1/0	1/2	4/3				1/5	2/0			0/1	4/3	1/0
C. ornatus	2										0/2				
C. salinarum		2	0/1									2			
Moloch horridus											0/1				
Pogona m.minor				1/0	2/2	0/1	2/0		1/0	2/0		1	1/0	4/0	
Tympanocryptis adelaidensis chapmani		1	2/2				2/0								

Table 10 (Contd.)

	Frank Hann									Peak Charles					
Landform Unit	**G**	**L**	**S**	**S**	**S**	**S**	**S**	**V**	**V**	**G**	**HG**	**L**	**V**	**V**	**V**
Vegetation Code (LH)	**10b**	**18a**	**17**	**19a**	**21**	**21**	**27**	**34b**	**21a**	**9**	**3a**	**13a**	**45a**	**20a**	**34c**
SCINCIDAE															
Cryptoblepharus plagiocephalus		1					0/1	0/9		0/1					0/3
Ctenotus impar			3/0	1/1	2/1				0/1	1/0				3/0	
C. schomburgkii			1/0	0/2				1/0	1/0	2/0					2/1
Egernia richardi									0/1						
Hemiergis i.initialis															0/2
H. peronii	13				1/0		0/3						1/0		0/3
Lerista distinguenda							1/0		0/1					0/2	
Menetia greyii	1							1/0		0/2	0/1			0/1	1/0
Morethia butleri								0/1							
M. obscura				1/1	0/2		1/0			1/0				1/0	0/7
Tiliqua occipitalis					0/1										
T. rugosa					0/1										
VARANIDAE															
Varanus gouldii										0/1					
V. rosenbergi		1								0/1					
TYPHLOPIDAE															
Ramphotyphlops australis													0/1		
BOIDAE															
Python spilotus											0/1				
ELAPIDAE															
Notechis curtus				0/1	0/1		1/0								0/1
Pseudonaja affinis							0/3	1/0							0/1
Vermicella bertholdi								0/1							
No. of species	5	7	6	11	14	4	8	11	8	14	9	2	5	9	16
Pit nights	–	–	25	50	75	25	75	75	50	75	75	–	75	75	75

Although several range extensions were documented, the majority of reptiles recorded were within their known distributions. Species at or close to their distributional limits within the Study Area were *Diplodactylus pulcher* (MR), *Heteronotia binoei* (MR), *Phyllodactylus marmoratus* (MR), *Ctenophorus isolepis* (MR), *Ctenotus atlas* (LC), *Hemiergis peronii* (FH, PC), *Lerista picturata* (MR), *Python spilotus* (PC), *Pseudechis australis* (LC), *Pseudonaja modesta* (MR), *Vermicella semifasciata* (LC). The gecko *D. pulcher* was not collected at Lake Cronin but has been recorded both to the east and west, representing the southern limits of its range.

The herpetofauna of Frank Hann National Park consisted of 5 amphibian and 27 reptile species. In comparison with other survey areas, few species were recorded at specific sampling sites. The richest assemblages being the 11 reptiles recorded from *Eucalyptus salmonophloia* Open Woodland (LH34b) and *E. transcontinentalis* Mallee (LH21); the latter site also contained 3 species of frogs.

Peak Charles National Park had 4 amphibian and 27 reptile species recorded during this survey. The sites with the richest reptile assemblage were the *E. salmonophloia* Open Woodland (LH34c) with 15 species and *Melaleuca uncinata* Tall Shrubland (LH9) with 13 species; a single species of frog was recorded at both sites.

The herpetofaunal assemblage at Lake Cronin comprised 7 amphibians and 35 reptiles. The richest community was that of the co-dominant *Eucalyptus longicornis-E. salmonopholia* Open Woodland (LH33a) where 20 reptiles and one frog were recorded. This contrasts with the *E. salmonophloia* Open Woodland (LH34) surrounding the campsite to the west of the lake where only 10 reptiles and 3 frogs were recorded. The Mallees (LH41a, LH43b, LH47) show appreciable differences in their herpetofaunal composition and species richness, a fact attributable to variability in soils and floristics as well as to the fire successional stage of the vegetation and the degree of litter accumulation.

Three amphibians and 41 reptile species were recorded at McDermid Rock, and, in contrast to Lake Cronin, the major habitats had a relatively uniform species richness (except LH9a) although faunal composition differed. The richest assemblage of 16 species occurred in *Allocasuarina campestris* Tall Shrubland (LH8) and *Eucalyptus salubris* Open Woodland (LH38a). Few of the sites examined at McDermid Rock show evidence of fire within the last 10-15 years and consequently litter build-up is considerable in all sites; three of the six reptiles recorded in the samphire area (LH9a) were associated with the litter around the *Melaleuca* copses or occasional isolated *Eucalyptus occidentalis* var. *stenantha.*

Birds

One hundred and five species of birds were recorded from the Study Area during these surveys. These comprised 44 non-passerine and 61 passerine species. Tables 11-14 list them together with numbers recorded in each sample site within the four survey areas. Figure 5 indicates the number of species and individuals accumulated for each sampling period for each site.

Table 11 Birds at Lake Cronin (LC) survey area indicating number seen in each sample site. The intensive sample sites (quadrats) are shown in the first columns followed by opportunistic observations. The upper figure indicates the total number of individuals, the lower figure indicates the number of observations. The four survey periods (September 1978, July

	QUADRATS							
Quadrat Days	5 5 2 5	5 5 2 5	5 5 5	5 5 5	5 5 1 5			
Sites	LH27a	LH33a	LH41	LH41a	LH46	cf LH3	LH11	
CASUARIDAE								
Dromaius novaehollandiae Emu					1 1			
PODICIPEDIDAE								
Podiceps novaehollandiae Black-throated Grebe								
Podiceps poliocephalus Hoary-headed Grebe								
ARDEIDAE								
Ardea pacifica White-necked Heron								
Ardea novaehollandiae White-faced Heron								
ANATIDAE								
Cygnus atratus Black Swan								
Tadorna tadornoides Mountain Duck								
Anas gibberifrons Grey Teal								
Anas superciliosa Black Duck*								
Malacorhynchus membranaceus Pink-eared Duck								
Chenonetta jubata Wood Duck								
ACCIPITRIDAE								
Lophoictinia isura Square-tailed Kite	X	X						
Accipiter cirrocephalus Collared Sparrowhawk								
Aquila morphnoides Little Eagle					1 1			
FALCONIDAE								
Falco berigora Brown Falcon				X	X		2 1	
Falco cenchroides Australian Kestrel	1 1 1 1							
Falco longipennis Australian Hobby								
MEGAPODIIDAE								
Leipoa ocellata Mallee Fowl								
RALLIDAE								
Fulica atra Coot								

1979, November 1979 and February 1981) are indicated as columns 1-4 respectively for each sample site. Vegetation types are listed in Table 5 and described in Appendix III. In quadrat data columns × = recorded outside census plot during census counts; ● = recorded overhead only; B = breeding data listed in Appendix IV. * = sighting by RAOU on 24-10-86.

OPPORTUNISTIC

	LH14a	LH27a	LH33a	Mozaic WL	LH41	LH41a	Mozaic mallee	LH46	LH50
									11 1 4 1
									2 120 2 3
	2 1								9 1
									1 1 1 1
	old nests								5 3
	82 2								1 18 2 1 3 1
									80 6 1 52 11 1 1 3
									4 2
									4 1
	1 1	1 1	1 1 1 1	1 1	1 1		1 1 1 1		
				4 1 B					1 1
		2 2	1 1	1 1		1 1		1 1	
		1 1 1 1						1 1	
			1 1						
				old nest					
									4 5 3 1

Table 11 (Contd.)

	QUADRATS						
Quadrat Days	5 5 2 5	5 5 2 5	5 5 5	5 5 5	5 5 1 5		
Sites	LH27a	LH33a	LH41	LH41a	LH46	cf LH3	LH11
OTIDAE							
Otis australis Australian Bustard							
CHARADRIIDAE							
Charadrius ruficapillus Red-capped Plover							
SCOLOPACIDAE							
Calidris acuminata Sharp-tailed Sandpiper							
RECURVIROSTRIDAE							
Himantopus himantopus Black-winged Stilt							
COLUMBIDAE							
Phaps chalcoptera Common Bronzewing		X					
PSITTACIDAE							
Glossopsitta porphyrocephala Purple-crowned Lorikeet		9 3 5 2 X	X X	X			
Polytelis anthopeplus Regent Parrot							
Platycercus icterotis Western Rosella							
Platycercus zonarius Ring-necked Parrot		2 X 1					
Neophema elegans Elegant Parrot					1 1		
PSITTACIDAE (Cont'd)							
Calyptorhynchus latirostris Carnaby's Cockatoo							
Cacatua roseicapilla Galah		3 1					
CUCULIDAE							
Cuculus flabelliformis Fan-tailed Cuckoo			1 1				
Cuculus pallidus Pallid Cuckoo							
Chrysococcyx basalis Horsfield's Bronze Cuckoo				X			
STRIGIDAE							
Ninox novaeseelandiae Boobook Owl							
PODARGIDAE							
Podargus strigoides Tawny Frogmouth				1 1			
AEGOTHELIDAE							
Aegotheles cristatus Australian Owlet-nightjar		1 1					
CAPRIMULGIDAE							
Eurostopodus argus Spotted Nightjar							
MEROPIDAE							
Merops ornatus Rainbow Bee-eater		1 1	1 1				5 1

OPPORTUNISTIC

	LH14a	LH27a	LH33a	Mozaic WL	LH41	LH41a	Mozaic mallee	LH46	LH50
								1 1 1 1	
	16 2								
	2 1								
	1 1								
			1 2 1 2				1 1 1 1	2 2	3 2
			9 6 10 2 4 1 3 1	25 9 5 3	2 4 1 1	1 1	9 3 3 1		
			1 1	8 1					
			1 1	3 1					
			2 1 1 1	2 6 2 1 2 1			9 1 3 1		
									3 1
			5 5		1 1	1 1			
	1 1								
			3 3			1 1			
			1 1		1 1				5 2
			2 1 6 2 1 6					1 1	
									1 1
			2 4 1 3	2 2 1B 1			1 1		

Table 11 (Contd.)

	QUADRATS						
Quadrat Days	5 5 2 5	5 5 2 5	5 5 5	5 5 5	5 5 1 5		
Sites	LH27a	LH33a	LH41	LH41a	LH46	cf LH3	LH11
HIRUNDINIDAE							
Hirundo nigricans	2	14	4	2			4
Tree Martin	1	4	2	1			1
MOTACILLIDAE							
Anthus novaesseelandiae	4 1 2						
Richard's Pipit	1 1 1						
CAMPEPHAGIDAE							
Coracina novaehollandiae		1	1				
Black-faced Cuckoo-shrike		1 X	1	X X	X		
Lalage sueurii	1						
White-winged Triller	1						
PACHYCEPHALIDAE							
Microeca leucophaea	1	6 1	1	1 3			
Jacky Winter	1	4 1	1	1 2			
Petroica cucullata					1	1	
Hooded Robin					1	1	
Petroica goodenovii		1	1	1 2			
Red-capped Robin		1	1	1 1			
Eopsaltria australis		1	1				
Yellow Robin		X 1	X 1	X			
Pachycephala pectoralis	4		4	1			
Golden Whistler	3		3	1			
Colluricincla harmonica	3 2	1 1 1	3 2	2			
Grey Shrike-thrush	3 2	1 1 X 1	3 2	2			
Falcunculus frontatus							
Shrike-tit							
Oreoica gutturalis		1		1 1			
Crested Bellbird		X 1 X		1 1	X X		
MONARCHIDAE							
Rhipidura albicauda							
White-tailed Fantail							
Rhipidura fuliginosa						1	
Grey Fantail						1	
Rhipidura leucophrys		1 2				3	
Willie Wagtail		1 X 2				2	
ORTHONYCHIDAE							
Cinclosoma castanotum		6	2				
Chestnut Quail-thrush		4 X	2				
Drymodes brunneopygius		1 3 3	6 1 1 3	1			
Southern Scrub-robin		1 3 3	1 1 1 3	1			
Pomatostomus superciliosus		8 6	5				
White-browed Babbler		2 X 1	X 1				
ACANTHIZIDAE							
Gerygone gusca					X		
Western Flycater							
Smicrornis brevirostris		28 24 10 35	12 11 2 22	23 16 14 15	6 2		
Weebill		14 11 6 12	6 4 1 9	10 7 4 6	3 1		
Acanthiza apicalis		8 7 1 1	4 11 5 9	6 5 2 3	2 6	5 2	1
Broad-tailed Thornbill		5 4 1 1	3 6 1 5	5 3 1 2	1 5	2 1	1
Acanthiza chrysorrhoa						2	
Yellow-rumped Thornbill						1 B	

OPPORTUNISTIC

	LH14a	LH27a	LH33a	Mozaic WL	LH41	LH41a	Mozaic mallee	LH46	LH50
	2 1	1 1	2 19 1 4	6 1					2 3 1 1
	3 3	2 1 2 1		5 3				1 1	
	1 1	1 1	6 14 3 3 3 3	1 1 1 1	1 1	1 2 1 2	1 1 1 1	2 1 1 1	
				1 1					
			1 3 6 1 2 6	2 1 1 1		1 2 1 2			
				1 1				1 1 1 1 1 1	
	7 5					2 2			4 8 3 3 4 2
			3 6 3 4			1 1			
			2 2	1 1 1 1	3 2	1 1			
	4 3		5 4 2 2 5 4 2 2		1 1		1 2 1 2		6 4
				1 1					
			3 2 2 3 2 2	1 1				3 1 2 3 1 2	
									3 3
									2 3 3 2 2 3
	1 1	1 1	4 1 6 3 1 6	2 2 2 2			1 1		3 2B 6 4 6 4
			2 2 1 2	2 1	2 1	1 2 1 1 2 1			
			5 5	1 1	4 5 1 4 5 1				
			5 8 1 1	5 2 4 1 1 1	1 1				
								1 1	
			34 14 29 15 5 11	4 4 2 19 2 2 1 6	6 2 15 3 1 6	18 7 12 9 3 5	2 10 8 1 4 3	2 5 1 2	
			6 2B 4 7 2 3 2 1	1 1 4 1 1 2	1 4 2 1 1 1	4 3 3 2	5 4 1 2	4 1 2 1 1 2	2 13 1 7
	4 2B		2 1						17 9 5 2

Table 11 (Contd.)

	QUADRATS						
Quadrat Days	5 5 2 5	5 5 2 5	5 5 5	5 5 5	5 5 1 5		
Sites	LH27a	LH33a	LH41	LH41a	LH46	cf LH3	LH11
Acanthiza uropygialis Chestnut-rumped Thornbill		X					
Sericornis cautus Shy Hylacola			1 1				
Sericornis frontalis White-browed Scrub-wren							
Sericornis fuliginosus Field-wren	2 5 1 2 3 X 1				12 4 3 4 6 4 2 4	1 1	
Pyrrholaemus brunneus Redthroat		12 1 4 3 1 4	2 2	3 3 6 3 3 1 4 3			
MALURIDAE							
Malurus pulcherrimus Blue-breasted Fairy-wren			6 4 1 1	3 1	2 1		
DAPHOENOSITTIDAE							
Daphoenositta chrysoptera Australian Sittella				3 1			
CLIMACTERIDAE							
Climacteris rufa Rufous Tree-creeper		8 3 4 X 3					
DICAEIDAE							
Dicaeum hirundinaceum Mistletoebird		1 1					
PARDALOTIDAE							
Pardalotus punctatus Spotted Pardalote		18 9					
Pardalotus striatus Striated Pardalote		18 47 11 X 13	9 1 5 X 1	5 3 4 2			1 1
ZOSTEROPIDAE							
Zosterops lateralis Grey-breasted Silvereye							
MELIPHAGIDAE							
Lichmera indistincta Brown Honeyeater		2 6 2 5					
Meliphaga cratitia Purple-gaped Honeyeater							
Meliphaga leucotis White-eared Honeyeater		3 1 1 5 3 1 1 5	12_B 4 2 2 11_B 4 2 2	6 3 2 3 6 3 1 3			5 1
Meliphaga ornata Yellow-plumed Honeyeater		4 27 24 2 7 14		3 1			
Melithreptus brevirostris Brown-headed Honeyeater		4 90 2 5	1 1	X X X			
Phylidonyris albifrons White-fronted Honeyeater					12 X 11		
MELIPHAGIDAE (Contd.)							
Phylidonyris melanops Tawny-crowned Honeyeater	55 50 6 42 31 3 X				62 36 4 10 35 20 3 7	1 1	1 1
Manorina flavigula Yellow-throated Miner							
Acanthagenys rufogularis Spiny-cheeked Honeyeater	X		X				
Anthochaera carunculata Red Wattlebird		31_B 3 5 18_B 2 3	2 1	2 1			

OPPORTUNISTIC

LH14a	LH27a	LH33a	Mozaic WL	LH41	LH41a	Mozaic mallee	LH46	LH50
		2 1	2 1					3 1
						2 1 1 1		
			1 1					
	5 11 1_B 2 3 8^B 1 2						9_B 10 1 4 4^B 9 1 3	
4 2		3 1 2 1			1 1			
10 2		2 1	4 1	5 1 1 1		4 3 1 1	2 6 1 2	
		2 8 1 1	6 1		4 1			
		1 2 1 10 1 1 1 8	5 1 3 1					
		1 1				1 1		
3 1		7 3	4 2		2 1	2 1		
1 1		46 5 2 38 17 4 1 16	8 3	1 1 7 1 1 2	13 2 8 6 2 4	6 3		
4 1								3_B 2 2^B 1
12 3		6 1 1 1	4 4 2 2 1 1					2 18 1 1 7 1
			4 1 2 1					
2 1 1 1		3 7 4 3 5 4	3 7 1 4 2 5 1 2	2 6 5 2 4 5	2 5 5 1 5 5	2 5 2 1 5 2		
		32 8 55 11 4 14	2 9 1 2			2 1		
5 33 1 3		2 35 1 2	35 6 12 2 1 1	22 7	7 6 4 3 1 1	20 15 1 1		
50 20			8 1			24 5	2 13 1 10	
6 2	36 154_B 13 8 24^B 95 10 8					1 1	24 38 16 26 15 25 10 18	
		6 1						
	1 1	2 2		2 2				3 3 3 2 2 2
		15 16 1 8 8 1	3 2	2 2	4 4	1 7 1 5		2 4 4 2 1 2 4 2

Table 11 (Contd.)

	QUADRATS							
Quadrat Days	5 5 2 5	5 5 2 5	5 5 5	5 5 5	5 5 1 5			
Sites	LH27a	LH33a	LH41	LH41a	LH46	cf LH3	LH11	
Epthianura albifrons White-fronted Chat	2 1							
ARTAMIDAE								
Artamus cinereus Black-faced Wood-swallow					X			
Artamus cyanopterus Dusky Wood-swallow		X X		3 1				
CRACTICIDAE								
Cracticus tibicen Magpie			1 1					
Cracticus torqnatus Grey Butcherbird		2 X X 2		1 1 1 1				
Strepera versicolor Grey Currawong		1 1 1 X 1	X					
CORVIDAE								
Corvus coronoides Australian Raven	X	X X	X X	X				

Ninety-seven (41 non-passerine and 56 passerine) species were recorded from the Lake Cronin and McDermid Rock survey areas. Sixteen species (39%) of non-passerines were common to both areas compared to 43 species (75%) of passerines. The presence of the freshwater Lake Cronin and the seasonal flooding of nearby saltlakes accounted for the 13 species of non-passerine wading and waterfowl species recorded in the Lake Cronin area but not at McDermid Rock. The cumulative number of bird species and individuals by sampling at Lake Cronin and McDermid Rock are indicated on Figure 6.

In 18 observation days at Lake Cronin survey area (Table 11), a total of 3729 birds were recorded in 1768 observations compared to 1820 birds in 877 observations during 15 observation days at McDermid Rock (Table 12). The respective mean daily figures are 207 and 121 individuals such that the mean number of birds recorded per observation day at McDermid Rock is only 58% of the number at Lake Cronin. An analysis of parameters affecting population densities at all the goldfields study sites will be presented in a separate publication.

Tables 13 and 14 show that 83 species (29 non-passerines and 54 passerines) were recorded from the Frank Hann and Peak Charles National Park survey areas. Seventeen species (58.6%) of non-passerines were common to both areas compared to 31 (58.5%) passerines. Table 15 lists the number of non-passerines and passerines observed at the four survey areas and indicates the number in common between each. Although there is a high degree of similarity between areas, Lake Cronin has a large group of non-passerines not shared by the other three areas.

Of the 5 quadrat sites at Lake Cronin the *Eucalyptus salmonophloia-E. longicornis* Open Woodland site (LH33a) was by far the richest site with 513 (44%) of the 1140 individuals recorded. This site also had the highest number of species

OPPORTUNISTIC

	LH14a	LH27a	LH33a	Mozaic WL	LH41	LH41a	Mozaic mallee	LH46	LH50
	1 1								
		8 2 3 1		3 1			4 1	7 2 6 1	
	12 1 3 1		1 4 20 1 1 3	3 1		7 3	4 1		
		3 2	1 1				2 1		
			4 1 2 1 4 1 2 1	1 1 1 1	2 2		2 1 1 1		2 2 1 2
			1 1 2 1 1 1	3 1 2 1	1 1	1 1	1 1		1 2 1 2
	2 1	2 6 2 3	9 4 4 7 6 4 2 4	4 1 2 1	3 2 2 2	2 1	1 1		5 3

(30) compared to the next richest site (LH41a) with 21 species and 159 individuals. A similar species richness was evident among reptiles with the same vegetation type having 20 species.

At McDermid Rock three sites were equally rich: the *Eucalyptus salubris* Low Woodland (LH38), the *Allocasuarina campestris* Tall Shrubland (LH8) and the *E. salmonophloia* Open Woodland (LH34a) each had about 25% of the 1204 individuals recorded in the six quadrats. At site LH8 in October 1978, many nectar-feeding passerines were feeding in flowering *Calothamnus quadrifidus* and in February 1981 flowering *Prosthanthera semiteres* ssp. *semiteres* was attracting White-fronted Honeyeaters. The saltlake samphire (LH9a) and the *Allocasuarina* heath (LH8c) had less than 5% of the total recorded.

The three sites (LH8, LH34a, LH38) which were high in numbers of individuals also had a high species richness with 22, 25, 27 species respectively. The sites low in individuals (LH9a and LH8c) had correspondingly few species, 10 and 8 respectively.

Breeding data for 22 species were recorded during these surveys and are presented in Appendix IV. These data indicate considerable spring breeding which is characteristic of the winter rainfall areas in southern Western Australia (Davies 1979).

Kitchener *et al.* (1982) indicated that woodlands were the most important habitat for birds in the wheatbelt with greater total species and greater species per hectare than other vegetation types. Data from the Lake Cronin area strongly supports that contention, as does that from McDermid Rock although to a lesser degree. The extent that an increase in structural complexity affects the bird species composition and population density will be presented when vegetation and bird data from all sites are synthesised.

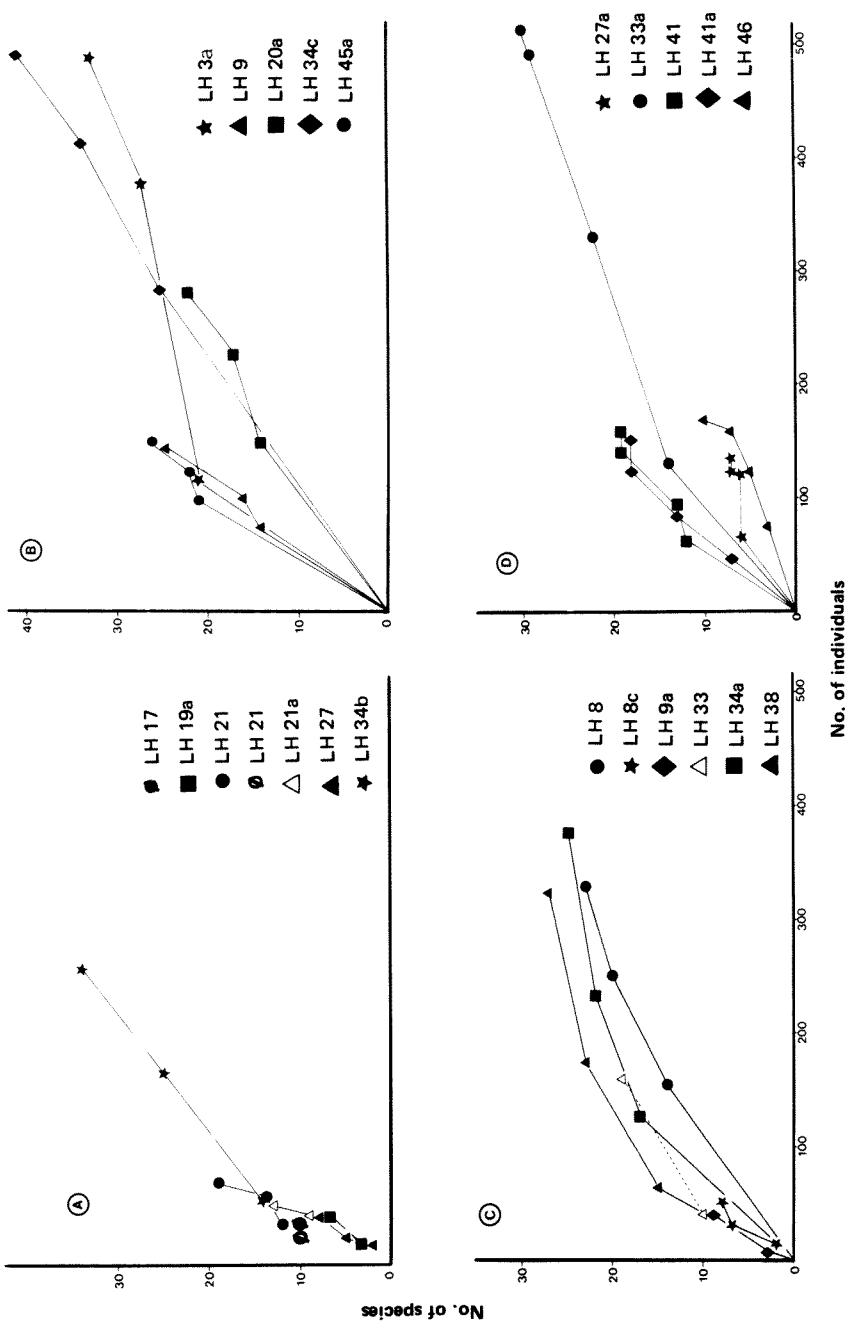

Figure 5 The accumulation during the three study periods of number of bird species and total number of individuals at each of the census quadrats at Frank Hann (A), Peak Charles (B) and McDermid Rock (C) study areas. The four study periods at Lake Cronin are indicated on (D).

Table 12 Birds at McDermid Rock (MR) survey area indicating number seen in each sample site. For explanation of data see Table 11. The three survey periods (September 1978, July 1979 and February 1981) are indicated as columns 1-3 respectively. Vegetation types are listed in Table 6 and described in Appendix III.

	QUADRATS						OPPORTUNISTIC							
Quadrat Days	5 5 5	5 5 5	5 5 5	0 4 5	5 5 5	5 5 5								
Locations	LH8	LH9a	LH8c	LH33	LH34a	LH38	LH5	LH8	LH10a	LH9a	LH8c	LH33	LH34a	LH38
CASUARIDAE														
Dromaius novaehollandiae Emu				1 1					faeces	footprints				
ACCIPITRIDAE														
Lophoictinia isura Square-tailed Kite								3 3						
Accipiter cirrocephalus Collared Sparrowhawk	1 1													
Accipiter fasciatus Brown Goshawk									1 1					
Aquila morphnoides Little Eagle								3 3					4 4	
FALCONIDAE														
Falco berigora Brown Falcon									2 2	1 1			1 1	
MEGAPODIIDAE														
Leipoa ocellata Mallee-fowl					1 1									
COLUMBIDAE														
Phaps chalcoptera Common Bronzewing									2 2					
PSITTACIDAE														
Glossopsitta porphyrocephala Purple-Crowned Lorikeet		2 1	•	1 1	19 9 8 6 X	1 7 18 1 2 2	2 1			14• 1	5• 3		2 25 11 1 6 3	8 7 2 1 2 1
Platycercus varius Mulga Parrot	2 1 X	X				2 1		3 3 1 1		2 1			2 1	
Platycercus zonarius Ring-necked Parrot	12 1 7 1				1 3 1 2			3 3 1 2	1 4 3 1 4 2				1 2 2 1 1 2	2 1
CUCULIDAE														
Cuculus flabelliformis Fan-tailed Cuckoo					X								1 1	
STRIGIDAE														
Ninox novaeseelandiae Boobook Owl				X								1 1		

Table 12 (Contd.)

	QUADRATS						OPPORTUNISTIC							
Quadrat Days	5 5 5	5 5 5	5 5 5	0 4 5	5 5 5	5 5 5								
Locations	**LH8**	**LH9a**	**LH8c**	**LH33**	**LH34a**	**LH38**	**LH5**	**LH8**	**LH10a**	**LH9a**	**LH8c**	**LH33**	**LH34a**	**LH38**
PODARGIDAE														
Podargus strigoides Tawny Frogmouth						1 1							2 1	
AEGOTHELIDAE														
Aegotheles cristatus Australian Owlet-nightjar				X	X	X						1 1	1 4 1 4	2 2
MEROPIDAE														
Merops ornatus Rainbow Bee-eater			X								20● 1			20● 1
HIRUNDINIDAE														
Hirundo ariel Fairy Martin									old nests					
Hirundo nigricans Tree Martin	11 X 2 X			5 1	6 3 2 1	4 2 2 1		1 2 5 1 1 1	4 2	2 1	2 4 1 2		2 1 4 1 1 1	2 1
MOTACILLIDAE														
Anthus novaeseelandiae Richard's Pipit	1 1							1 1						
CAMPEPHAGIDAE														
Coracina novaehollandiae Black-faced Cuckoo-shrike				3 2	X	2 1 1 X 1	1 1	1 1				1 1	1 2 1 2	2 1 1 1 1 1
PACHYCEPHALIDAE														
Microeca leucophaea Jacky Winter				7 X 6	7 4 4 2	5 8 11 5 5 5				1 1		2 2 2 2	4 5 3 4	4 4 2 3
Petroica cucullata Hooded Robin						4 2								
Petroica goodenovii Red-capped Robin	1 1	2 2		1 1	1 1	5 6 3 X 6				2 1				3 1 3 1
Eopsaltria australis Yellow Robin									1 1					
Pachycephala pectoralis Golden Whistler	7 4 7 4		X					5 2 5 2	1 2 1 2		1 1			3 2
Pachycephala rufiventris Rufous Whistler					X								1 1	

Table 12 (Contd.)

	QUADRATS						OPPORTUNISTIC							
Quadrat Days	5 5 5	5 5 5	5 5 5	0 4 5	5 5 5	5 5 5								
Locations	LH8	LH9a	LH8c	LH33	LH34a	LH38	LH5	LH8	LH10a	LH9a	LH8c	LH33	LH34a	LH38
PACHYCEPHALIDAE (Contd.)														
Colluricincla harmonica Grey Shrike-thrush	1 1 1 1 X	X		X X	6 1 3 1 X	1 2 X 1 2		3 3 3 3	4 2	1 1		2 1 2 1	2 3 1 2 3 1	2 5 1 2 5 1
Oreoica gutturalis Crested Bellbird	1 1 X X		X X X	X	8 2 6 X 2	1 X 1	1 1	4 2 3 4 2 3			3 2 2 3 2 2	2 2	3 2 1 3 2 1	2 2 2 2
MONARCHIDAE														
Rhipidura leucophrys Willie Wagtail		X		1 X 1	7 3 11 2 3 11	2 1 1 1		1 1		1 1		1 4 1 4	2 5 2 5	1 1 1 1 1 1
ORTHONYCHIDAE														
Cinclosoma castanotum Chestnut Quail-thrush					3 X 2	1 1							1B 1 1	
Drymodes brunneopygius Southern Scrub-robin	4 3 X 4 3		1 4 X 1 4		2 2 2 1			2 2 2 2	2 4 5 1 3 4		1 5 1 5			
Pomatostomus superciliosus White-browed Babbler	4 13 4 1 4 1	2 1 X		6 1	2 4 8 1 2 2	4 8 X 2 1		13 10 3 3	6 2	3 1			6 1	2 9 1 3
ACANTHIZIDAE														
Smicrornis brevirostris Weebill	4 3 2 2	X		19 29 6 13	2 2 22 1 1 10	13 22 39 7 8 17	9 8* 4 4		3 3 1 1	2 1		2 18 1 6	3 15 24 2 6 10	12 30 12 6 11 5
Acanthiza apicalis Broad-tailed Thornbill	16 19 16 8 5 12	3 2 3 2 X	6 7 8 3 5 5	4 1 2 1	4 8 3 4	4 5 9 1 3 5	2 1	3 2 1 2	2 1	1 2 1 1	3 4 2 4		2 2	
Acanthiza Chrysorrhoa Yellow-rumped Thornbill		3 X 1								6 2				4 1
Acanthiza uropygialis Chestnut-rumped Thornbill	6 6 2 3	6 2 X			4 2 5 1 1 2	6 8 3 4	3 1			2 2 3 1 1 1				3 9 1 3
Pyrrholaemus brunneus Redthroat	7 3 6 6 3 4	X X	4 7 3 6		2 4 1 1 3 1	1 5 X 1 3		4 8 4 2 5 4	1 3 1 1 3 1	3 3 3 1	1 3 1 3		4 3 3 3	1 1 3 1 1 3
Sericornis fuliginosus Striated Field-wren			1 X 1 X								2 1 1 1			
MALURIDAE														
Malurus pulcherrimus Blue-breasted Fairy-wren	5 3 2 1				4 1				2 5 19 1 2 6					

Table 12 (Contd.)

	QUADRATS						OPPORTUNISTIC							
Quadrat Days	5 5 5	5 5 5	5 5 5	0 4 5	5 5 5	5 5 5								
Locations	LH8	LH9a	LH8c	LH33	LH34a	LH38	LH5	LH8	LH10a	LH9a	LH8c	LH33	LH34a	LH38
DAPHOENOSITTIDAE														
Daphoenositta chrysoptera Australian Sittella						1 7 8 1 1 1								3 3 1 1
CLIMACTERIDAE														
Climacteris rufa Rufous Tree-creeper				4 11 2 8	2 11 7 2 9 6	5 4 15 3 3 11						13 9	3 8 2 6	12 17 10 9 17 8
DICAEIDAE														
Dicaeum hirundinaceum Mistletoebird						X							1 1	1 1
PARDALOTIDAE														
Pardalotus punctatus Spotted Pardalote				1 1										
Pardalotus striatus Striated Pardalote				2 6 1 4	7 5 7 X 3	6 3 4 X 2	2 1	2 1				3 5 1 2	3 8 3 2 3 2	6 14 6 3 5 2
ZOSTEROPIDAE														
Zosterops lateralis Grey-breasted White-eye								2 1						
MELIPHAGIDAE														
Lichmera indistincta Brown Honeyeater	35 10 9 7		1 X 1			1 1	2 1 1 1	19 26 1 7 6 1	6 2 1 2		2 1			
Mellphaga cratitla Purple-gaped Honeyeater							8 3 2 1		15 11 5 1 4 2					
Meliphaga leucotis White-eared Honeyeater	5 X 5			X	1 1		1 1	2 5 2 5	3 2 3 2			1 1	2 1	
Meliphaga ornata Yellow-plumed Honeyeater	1 1 1 1			3 20 2 12	47 51 51 27 25 28	15 21 7 12 11 5						19 7	10 9 31 2 2 8	32 23 14 6 9 5
Meliphaga virescens Singing Honeyeater	X	X		1 1		X		1 1		2 2				1 1
Melithreptus brevirostris Brown-headed Honeyeater	12 7 X	17 1		3 1	X X	1 1	2 1	2 14 1 2	6 1			6 1	1 15 8 1 1 1	

Table 12 (Contd.)

	QUADRATS						OPPORTUNISTIC							
Quadrat Days	5 5 5	5 5 5	5 5 5	0 4 5	5 5 5	5 5 5								
Locations	LH8	LH9a	LH8c	LH33	LH34a	LH38	LH5	LH8	LH10a	LH9a	LH8c	LH33	LH34a	LH38
MELIPHAGIDAE (contd)														
Phylidonyris albifrons White-fronted Honeyeater	56 7 30 13 5 15		8 5 X					38 12 11 7 3 4			5 1 2 1			
Phylidonyris melanops Tawny-crowned Honeyeater			2 1								7 2			
Manorina flavigula Yellow-throated Miner				3 23 1 3	4 2	5 1	8 1		2 1			5 1		
Acanthagenys rufogularis Spiny-cheeked Honeyeater	2 2 2 1	2 2 X		X	1 1	1 1		1 1		6 3 6 3		1 1	1 1	1 1
Anthochaera carunculata Red Wattlebird		X		X	6 4	2 9 1 6	2 1	2 1	2 2	7 4		4 3	4 8 3 3	4 15 2 12
Epthianura albifrons White-fronted Chat			2 1											
ARTAMIDAE														
Artamus cyanopterus Dusky Wood-swallow	X			1 1	4 6 3 1			12 2					2 1 1 1	
CRACTICIDAE														
Cracticus nigrogularis Pied Butcherbird													1 1	
Cracticus torquatus Grey Butcherbird	1 1	1 1 X		3 3	X	1 1 1 1		1 1		1 6 1 6		5 5	1 2 3 1 2 1	2 1 3 2 1 3
Strepera versicolor Grey Currawong	X							2 2					3 1 2 1	
CORVIDAE														
Corvus bennetti Little Crow	X	X						10 3	3 1	2 1			2 1	
Corvus coronoides Australian Raven		X								1 1				

Table 13 Birds at Frank Hann (FH) National Park survey area indicating number seen in each sample site. For explanation of data see Table 11. The three survey periods (March 1980, November 1980 and September 1981) are indicated as columns 1-3 respectively. Vegetation types are listed in Table 7 and described in Appendix III.

	QUADRATS																OPPORTUNISTIC																
Sites	LH17			LH 19a		LH 21a		LH21			LH21			LH27			LH34b			LH17	LH21			LH21	LH27			LH34b			Unspec-ified		
Months	March	Nov.	Sept.	Nov.	Sept.	March	Nov.	Sept.	March	March	Nov.	Sept.	March	Nov.	Sept.	March	Nov.	Sept.	March	March	Nov.	Sept.	March	March	Nov.	Sept.	March	Nov.	Sept.	March	Nov.	Sept.
CASUARIIDAE																																
Dromaius novaehollandiae Emu																					1 1	1 1						1 1				
ACCIPITRIDAE																																
Lophoictinia isura Square-tailed Kite																		X											2 2			
Aquila morphnoides Little Eagle																															1 1		
FALCONIDAE																																
Falco berigora Brown Falcon				1 1	3 1			X●				X				1 1			3 3			1 1			1 1				2 2	4 4	1 1
Falco cenchroides Australian Kestrel													X						2 2			1 1								3 3	
OTIDIDAE																																
Otis australis Australian Bustard																						1 1								4 4		
COLUMBIDAE																																
Phaps chalcoptera Common Bronzewing	3 2			X															6 4			10 3								7 2	2 2B	
Phaps elegans Brush Bronzewing																		2 1											1 1			
Ocyphaps lophotes Crested Pigeon																						1 1										
PSITTACIDAE																																
Glossopsitta porphyrocephala Purple-crowned Lorikeet	17 2						10 2	4 1								15 5	37 9	3 1									11 2	16 5	3 1	12 1		
Polytelis anthopeplus Regent Parrot		10 1						8 1																					15 1		20 1	
Platycercus zonarius Ring-necked Parrot																		X	2 1												1 1	
Platycercus varius Mulga Parrot																				1 1												
Platycercus icterotis Western Rosella																	1 1												3 1			
Neophema elegans Elegant Parrot																													2 1			
CUCULIDAE																																
Cuculus pallidus Pallid Cuckoo						1 1											X											1 1				
Cuculus flabelliformis Fan-tailed Cuckoo																1 1		X														
Chrysococcyx osculans Black-eared Cuckoo																													1 1			

Table 13 (Contd.)

Sites	QUADRATS																OPPORTUNISTIC																
	LH17	LH 19a		LH 21a		LH21			LH21	LH27			LH34b				LH17	LH21			LH21	LH27			LH34b			Unspecified					
Months	March	Nov.	Sept.	Nov.	Sept.	March	Nov.	Sept.	March	March	Nov.	Sept.	March	Nov.	Sept.		March	March	Nov.	Sept.	March	March	Nov.	Sept.	March	Nov.	Sept.	March	Nov.	Sept.			
Acanthiza uropygialis Chestnut-rumped Thornbill						3 1																							3 2			
Acanthiza chrysorrhoa Yellow-rumped Thornbill				1 1																												
Pyrrholaemus brunneus Redthroat															2 1											2 1						
Sericornis cautus Shy Hylacola						2 1																										
Sericornis fuliginosus Striated Field-wren												1 1										2 1										
SYLVIIDAE																																
Cincloramphus cruralis Brown Songlark	1 1																															
CLIMACTERIDAE																																
Climacteris rufa Rufous Treecreeper													6 5		2 1										2 1	5 1						
PARDALOTIDAE																																
Pardalotus sp. Spotted/Yellow-rumped Pardalote																										4 2						
Pardalotus striatus Striated Pardalote													1 1		4 2																	
ZOSTEROPIDAE																																
Zosterops lateralis Grey-breasted White-eye								X						2 1																		
MELIPHAGIDAE																																
Lichmera indistincta Brown Honeyeater								1 1							1 1		2 1											1 1				
Meliphaga virescens Singing Honeyeater			X		2 2																											
Meliphaga ornata Yellow-plumed Honeyeater														3 2	33 21					6 1						10 1						
Meliphaga cratitia Purple-gaped Honeyeater	1 1								5 3				6 4	16 12							4 2				42 2							
Meliphaga leucotis White-eared Honeyeater	1 1			28 22	X				3 2				3 3									1 1					1 1	3 2				
Melithreptus brevirostris Brown-headed Honeyeater						7 1																										
Phylidonyris melanops Tawny-crowned Honeyeater			12 9		X	1 1		3 2	1 1	12 8		12 7	1 1								1 1	1 1		5 1				2 2			1 1	B
Manorina flavigula Yellow-throated Miner																								4 1								
Anthochaera carunculata Red Wattlebird				1 1		5 1			2 1				2 1	3 3	X									4 2	14 5	3 1					
ARTAMIDAE																																
Artamus cyanopterus Dusky Wood-swallow														3 3	12 10		3 2				4 1				1 1	2 1	6 3					
CRACTICIDAE																																
Cracticus torquatus Grey Butcherbirtd		X				X			X				4 4									1 1										

Table 13 (Contd.)

	QUADRATS																OPPORTUNISTIC																
Sites	LH17	LH 19a		LH 21a		LH21			LH21	LH27			LH34b			LH17	LH21			LH21	LH27			LH34b			Unspecified				
Months	March	Nov.	Sept.	Nov.	Sept.	March	Nov.	Sept.	March	March	Nov.	Sept.	March	Nov.	Sept.	March	March	Nov.	Sept.	March	March	Nov.	Sept.	March	Nov.	Sept.	March	Nov.	Sept.			
Chysococcyx basalis Horsfield's Bronze Cuckoo								X				X			1 1							1 1									
STRIGIDAE																																
Ninox novaeseelandiae Boobook Owl																1 1										11 6						
Podargus strigoides Tawny Frogmouth																				1 1								1 1			
CAPRIMULGIDAE																																
Eurostopodus argus Spotted NIghtjar																					1 1											
HIRUNDINIDAE																																
Hirundo nigricans Tree Martin	3 1								5 3	4 3			7 3	28 9	24 8	9 2								1 1		15 1					
MOTACILLIDAE																																
Anthus novaeseelandiae Richard's Pipit	1 1										1 1																5 4	1 1				
CAMPEPHAGIDAE																																
Coracina novaehollandiae Black-faced Cuckoo-shrike			X	1 1	1 1									3 2	1 1										3 3			5 5	4 4		
PATHYCEPHALIDAE																																
Microeca leucophaea Jacky Wmter															1 1																	
Petroica goodenovii Red-capped Robin	6 5																															
Petrioca cucullata Hooded Robin														1 1											1 1			1 1			
Eopsaltria australis Yellow Robin													3 3															2 1				
Pachycephala pectoralis Golden Whistler													1 1		2 1																	
Pachycephala rufiventris Rufous Whistler															1 1																	
Colluricincla harmonica Grey Shrike-thrush				1 1	X	1 1								1 1	2 1					2 1		1 1			5 4	5 2			3 1		
Oreoica gutturalis Crested Bellbird	X	X	X	X	X			X												2 1	1 1	1 1		2 1					4 4		
MONARCHIDAE																																
Rhipidura fuliginosa Grey Fantail																									1 1							
Rhipidura leucophrys Willie Wagtail													4 4	1 1	1 1									1 1		2 1	1 1				
ORTHONYCHIDAE																																
Drymodes brunneopygius Southern Scrub-robin									1 1											1 1											
ACANTHIZIDAE																																
Smicrornis brevirostris Weebill						4 1			2 1				2 1	8 4	X										20 7	5 1					
Acanthiza apicalis Broad-tailed Thornbill	5 4	7 4	12 8	12 9	X		15 11	9 5	1 1		7 5	4 3		5 3							3 1		2 1			5 1	7 2					

Table 13 (Contd.)

	QUADRATS																		OPPORTUNISTIC																	
Sites	LH17			LH 19a			LH 21a			LH21			LH21			LH27			LH34b			LH17			LH21			LH21			LH27			LH34b			Unspecified		
Months	March	Nov.	Sept.	March	Nov.	Sept.	March	Nov.	Sept.	March	Nov.	Sept.	March	Nov.	Sept.	March	Nov.	Sept.	March	Nov.	Sept.	March	March	Nov.	Sept.	March	March	Nov.	Sept.	March	Nov.	Sept.	March	Nov.	Sept.	March	Nov.	Sept.
Cracticus tibicen Australian Magpie																						13 2														1 1	1 1	
Strepera versicolor Grey Currawong																																					1 1	
CORVIDAE																																						
Corvus coronoides Australian Raven								X	X	X										X	X	2 1				2 1		1 1			1 1			6 1	2 2	1 1
Corvus bennetti Little Crow										X											X						1 1		3 1			3 1					

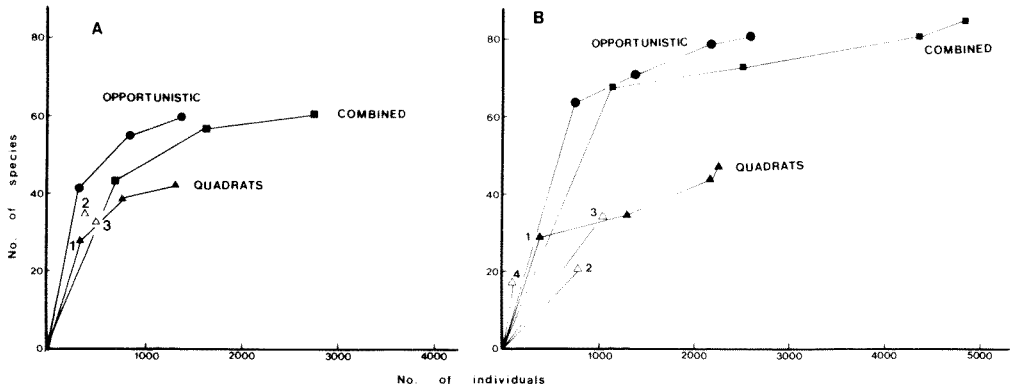

Figure 6 The cumulative number of bird species and number of individuals recorded for (A) the three study periods at McDermid Rock (MR) and (B) the four study periods at Lake Cronin (LC). Data collected on bird quadrats are indicated separately for each study period and combined as quadrat totals. Data collected opportunistically is indicated separately, and also combined with quadrat data.

Table 14 Birds at Peak Charles (PC) National Park survey area indicating number seen in each sample site. For explanation of data and survey periods see Table 13. Vegetation types are listed in Table 8 and described in Appendix III.

	QUADRATS					OPPORTUNISTIC					
SITE	**LH9**	**LH3a**	**LH45a**	**LH20a**	**LH34c**	**LH9**	**LH3a**	**LH13a**	**LH45a**	**LH20a**	**LH34c**
CASUARIDAE											
Dromaius novaehollandiae Emu							T			2 1	
ACCIPITRIDAE											
Lophoictinia isura Square-tailed Kite						1 1					2 1
Accipiter cirrocephalus Collared Sparrowhawk					2 2						
Aquila morphnoides Little Eagle							1 2 1 1				
Aquila audax Wedge-tailed Eagle		10 4	1 1		1● 1		3 1● 1 1	3 1			
FALCONIDAE											
Falco peregrinus Peregrine Falcon		2 1 X	1 1								
Falco lonipennis Australian Hobby					1 1● X						4 1 2 1
Falco berigora Brown Falcon	X		X		1 1 X		2 2		1 1		1● 12 1 6
Falco cenchroides Australian Kestrel		X			X		1 1● 1 1	1 1			2 2●
MEGAPODIDAE											
Leipoa ocellata Mallee Fowl						old nest	1 1				
COLUMBIDAE											
Phaps chalcoptera Common Bronzewing	1 1					1 1					1 1
Phaps elegans Brush Bronzewing		2 2				1 1	2 1				
PSITTACIDAE											
Glossopsitta Porphyrocephala Purple-crowned Lorikeet	20 1 4 1	15 1	4 1	44 3	65 X 11				6● 1		3 1

Table 14 (Contd.)

SITE	QUADRATS					OPPORTUNISTIC					
	LH9	LH3a	LH45a	LH20a	LH34c	LH9	LH3a	LH13a	LH45a	LH20a	LH34c
PSITTACIDAE (Contd.)											
Polytelis anthopeplus Regent Parrot					13 4	22 1	2 1				20 2 1 2
Platycercus zonarius Ring-necked Parrot		1 X 1 1 1	1 1		10 2 7 6 1 4	4 2	3 2 1 1	2 1		1 1	
Platycercus icterotis Western Rosella		11 4			1 1						5 2
CUCULIDAE											
Cuculus pallidus Pallid Cuckoo					X						1 1
Cuculus flabelliformis Fan-tailed Cuckoo		2 1		1 1		1 1					1 2 1 2
Chrysococcyx osculans Black-eared Cuckoo					1 1		1 1				1 1
Chrysococcyx basalis Horsfield's Bronze Cuckoo	1 1	1 1	1 1	X	X		1 1				1 1
STRIGIDAE											
Ninox novaeseelandiae Boobook Owl											2 1 7 2 1 4
PODARGIDAE											
Podargus strigoides Tawny Frogmouth		1 1									
AEGOTHELIDAE											
Aegotheles cristatus Australian Owlet nightjar											4 3
MEROPIDAE											
Merops ornatus Rainbow Bee-eater					25 11		1 1			2 1	2 2
HIRUNDINIDAE											
Hirundo nigricans Tree Martin			2 2	3 2	4 22 3 1 10 2	1 1					10 2
MOTACILLIDAE											
Anthus novaeseelandiae Richard's Pipit								2 1 1 1			

Table 14 (Contd.)

SITE	QUADRATS					OPPORTUNISTIC					
	LH9	LH3a	LH45a	LH20a	LH34c	LH9	LH3a	LH13a	LH45a	LH20a	LH34c
CAMPEPHAGIDAE											
Coracina novaehollandiae Black-faced Cuckoo-shrike		1 1		1 1		2 1	1 2 1 1				1 3 1 1
PACHYCEPHALIDAE											
Petroica goodenovii Red-capped Robin								1 1			
Pachycephala pectoralis Golden Whistler		2 X 2				1 1	1 1 1 1				
Colluricincla harmonica Grey Shrike-thrush		X	2 2 2 2	X	2 5 1 2 5 1	1 2 1 2	1 1			1 1	1 3 1 3
Oreoica gutturalis Crested Bellbird	5 1 5 1	X X	2 1 1 1 1 1	3 X X 3	X X		3 1 3 1		1 1	1 1 1 1	2 3 1 2 3 1
MONARCHIDAE											
Rhipidura leucophrys Willie Wagtail		2 2			1 4 11 1 4 6		2 1 2 1	1 2 1 1			
ORTHONYCHIDAE											
Cinclosoma castanotum Chestnut Quail-thrush	2 1					2 2					
Drymodes brunneopygius Southern Scrub-robin	1 3 2 1 2 2		7 8 7 8	4 1 4 1	1 1	1 1	2 1				
Pomatostomus superciliosus White-browed Babbler			4 5 1 2				10 7 1 2	6 1			
ACANTHIZIDAE											
Aphelocephala leucopsis Southern Whiteface							3 2				
Smicrornis brevirostris Weebill	6 1 X 3 1	10 21 4 7	5 X 2	22 22 9 8	5 2	2 1	1 1		3 1		4 1
Acanthiza apicalis Broad-tailed Thornbill	11 9 8 6 6 5	20 15 11 11 10 7	2 2 2 2	2 2 5 1 1 5	2 4 2 4		2 1	3 1		1 1	2 1 1 1
Acanthiza chrysorrhoa Yellow-rumped Thornbill		2 1						6 1			1 1
Pyrrholaemus brunneus Redthroat		6 5 4 4	1 1		1 1		1 1				

Table 14 (Contd.)

SITE	QUADRATS					OPPORTUNISTIC					
	LH9	LH3a	LH45a	LH20a	LH34c	LH9	LH3a	LH13a	LH45a	LH20a	LH34c
ACANTHIZIDAE (Contd.)											
Scericornis frontalis White-browed Scrub-wren	2 2	9 18 5 11					10 1				
Sericornis cautus Shy Hylacola	1 4 1 4		1 1			1 1				1 2 1 1	
MALURIDAE											
Malurus pulcherrimus Blue-breasted Fairy-wren	18 5										
DAPHOENOSITTIDAE											
Daphoenositta chrysoptera Australian Sittella					2 1						
DICAEIDAE											
Dicaeum hirundinaceum Mistletoebird					2 2 1 1						2 2
PARDALOTIDAE											
Pardalotus striatus Striated Pardalote	1 1				4 7 4 6						
ZOSTEROPIDAE											
Zosterops lateralis Grey-breasted White-eye	2 1	12 170 9 7 49 5	1 X 1		4 1		8 2		2 1		
MELIPHAGIDAE											
Lichmera indistincta Brown Honeyeater		5 19 2 18	6 6	1 X 1	20 X 16	1 1	1 10 1 1			1 1	1 3 1 1
Meliphaga virescens Singing Honeyeater	2 2			X						1 1	
Meliphaga ornata Yellow-plumed Honeyeater	10 X 6	42 28	8 7	52 7	22 32 16 14 14 12	1 1 1 1	1 5 1 1				1 1
Meliphaga cratitia Purple-gaped Honeyeater	2 2	1 9 6 1 6 3	2 11 1 4	8 2 5 2	18 9 10 3	1 1	2 1				
Meliphaga leucotis White-eared Honeyeater	12 1 12 1	11 10	19 19	16 20 1 15 16 1	6 2 6 2						1 1
Melithreptus brevirostris Brown-headed Honeyeater				12 1 1 1	12 1						

Table 14 (Contd.)

SITE	QUADRATS					OPPORTUNISTIC					
	LH9	LH3a	LH45a	LH20a	LH34c	LH9	LH3a	LH13a	LH45a	LH20a	LH34c
MELIPHAGIDAE (Contd.)											
Phylidonyris novaehollandiae New Holland Honeyeater		1 7 1 4	15 13	2 1	27 15		4 1		3 1		
Phylidonyris nigra White-cheeked Honeyeater			9 7								
Phylidonyris albifrons White-fronted Honeyeater		4 2	6 6	5 4		1 1	1 1				
Phylidonyris melanops Tawny-crowned Honeyeater	1 4 1 3	X	2 2	27 16 25 9	26 20		1 1	1 1			
Manorina flavigula Yellow-throated Miner								4 1			
Acanthagenys rufogularis Spiny-cheeked Honeyeater		2 1			2 1		1 1	7 1			
Anthochaera carunculata Red Wattlebird	7 1 3 7 1 2	1 3 2 1 2 2	13 X 13	1 2 1 2	19 3 15 12 3 8			1 1		14 5	
ARTAMIDAE											
Artamus cyanopterus Dusky Wood-swallow					1 2 1 1	5 1		2 1			
Artamus personatus Masked Wood-swallow											50● 1
CRACTICIDAE											
Cracticus torquatus Grey Butcherbird	4 X X 3	1 X 1	5 5	4 X 3	10 X 8	1 1 1 1	1 1		1 1		1 1 1 1
Cracticus tibicen Australian Magpie					3 1 1 1 1 1						
Strepera versicolor Grey Currawong	X X	X		1 1	4 X 2	1 1 1 1	1 1 1 1			1 1	11 7
CORVIDAE											
Corvus sp.	X				X 1 6 1 6	2 1 1 1	6 1				1 2B 1 2B

T = Tracks ● = Overhead only B = Breeding

Table 15 The total avifauna and number of passerines and non-passerines at each of the four faunal survey areas with the number of shared species indicated.

	Total Species				Non-passerines				Passerines			
No. species	90	64	63	67	39	17	22	24	51	47	41	43
Survey Area	LC	MR	FH	PC	LC	MR	FH	PC	LC	MR	FH	PC
LC		59	57	59		16	18	21		43	39	38
MR			49	50			12	15			37	36
FH				48				17				31
PC												

In a paper outlining conservation status of wheatbelt birds Kitchener *et al.* (1982) recognised 20 species of resident passerines recorded only in natural vegetation in the wheatbelt. Fourteen of these were recorded in the Lake Johnston-Hyden Study Area, all 14 being at Lake Cronin, 11 at McDermid Rock, 10 at Frank Hann and 9 at Peak Charles. These fourteen species are *Microeca leucophaea, Eopsaltria australis, Pachycephala pectoralis, Colluricincla harmonica, Falcunculus frontalis, Oreoica gutturalis, Cinclosoma castanotum, Drymodes brunneopygius, Sericornis cautus, S. frontalis, S. fuliginosus, Malurus pulcherrimus, Climacteris rufa* and *Meliphaga leucotis.* An additonal species, *Stipiturus malachurus,* although not recorded by us, has been collected in the Lake Cronin area.

Accordingly, these areas are of great importance in conserving populations of wheatbelt birds whose conservation future in the wheatbelt is uncertain because of habitat destruction. The remaining 5 species listed by Kitchener *et al.* (1982) would be unlikely to occur in the Study Area on their presently known distribution.

Mammals

A total of 28 species of extant native or feral mammals were recorded from the Lake Johnston-Hyden Study Area during this survey (Tables 16, 17).

The evidence for Echidnas, *Tachyglossus aculeatus,* and most feral species was based on fresh tracks or scats; skulls of *Canis familiaris, Vulpes vulpes, Felis catus* and *Oryctolagus cuniculus* were collected from a dingo baiting station on North Lake Johnston during September 1978. No evidence of recent occupancy was noted around the nests of the Stick-nest Rat, *Leporillus apicalis,* recorded at Peak Charles and McDermid Rock. A record of *Dasyurus geoffroii* was made by Peter King (pers. comm.) of the Agricultural Protection Board who reported a specimen from a mallee/sedge community 0.5 km south of the Norseman-Lake King Road about 15 km south of Ninety Mile Tank, the animal had taken a bait

laid for dingoes; Kym Robinson (pers. comm.) also reported capturing an individual in his exploration camp near Mt Holland during summer 1984/85.

All other species were either caught or observed and representative specimens of all small mammals lodged with the Museum.

Despite the relatively rich terrestrial small-mammal assemblage (12 species) of the Study Area, no sample site contained more than four species. This contrasts with the Jackson-Kalgoorlie Study Area (Dell and How 1985) where heath on Sandplain contained 8 of the 12 small mammal species recorded.

A comparison of this faunal assemblage with the general distributions of recent mammals from Kitchener and Vicker (1981) indicates that many species may have disappeared from the region. Although no major specific collections have been made previously within the Study Area, many additional species could have

Table 16 Mammals at Lake Cronin (LC) and McDermid Rock (MR) survey areas indicating number trapped in each sample site. Tracks are indicted by T and animal sightings by S (S1 = <5; S2 = 3-10; S3 = >10 individuals); C = cranium only; N = old nests. Totals for the three survey periods (September 1978, July 1979, February 1981) are included. Vegetation types are listed in Tables 5 and 6 and described in Appendix III.

	LAKE CRONIN												
Landform Unit	**L**	**S**	**UN**	**V**	**V**	**V**	**V**	**V**	**V**	**V**	**V**	**V**	**V**
Vegetation Code (LH)	**14a**	**27a**	**28a**	**33a**	**34**	**41**	**41a**	**43**	**43a**	**43b**	**46**	**47**	**50**
TACHYGLOSSIDAE													
Tachyglossus aculeatus						T							
DASYURIDAE													
Ningaui yvonneae								6	1	2			
Sminthopsis crassicaudata													
S. granulipes		20							3		1		
S. dolichura													
S. gilberti					1		2						
BURRAMYIDAE													
Cercartetus concinnus									1	1			
MACROPODIDAE													
Macropus fuliginosus		S_3		S_1		S_2	S_1				S_3		S_1
M. robustus													
MOLOSSIDAE													
Mormopterus planiceps				1									1
Tadarida australis				S_3									
VESPERTILIONIDAE													
Chalinolobus gouldii				1									7
Eptesicus regulus					1								13
Nyctophilus geoffroyi				1									3
N. major													
Scotorepens balstoni													
MURIDAE													
Leporillus sp.													
Mus domesticus		5							1	3	12		
Notomys mitchellii									3	9	1	1	
Pseudomys albocinereus											1		
P. bolami													
CANIDAE													
Canis familiaris	T												
Vulpes vulpes						T	T	T					
FELIDAE													
Felis catus													
LEPORIDAE													
Oryctolagus cuniculus	S_1				S_1								S_2

been expected on the basis of distribution and habitat preference if they were still extant, e.g. *Phascogale calura, Antechinomys laniger, Trichosurus vulpecula, Isoodon obesulus, Leporillus apicalis* (old nests only recorded), and *Pseudomys occidentalis.* The biological survey of the Dragon Rocks Nature Reserve, about 80 km south-west of Lake Cronin (McKenzie *et al.* 1973), recorded *P. calura, T. vulpecula* and *P. occidentalis* and reported on a specimen of *A. laniger;* no evidence of these species were encountered during this survey although the Western Australian Museum has a specimen of *P. occidentalis* from Hatter's Hill, a location within the Study Area.

Several species appear to be at the extremes of their known ranges within the Study Area. The population of *Ningaui yvonneae* from near Lake Cronin is the most south-westerly of this newly described southern Australian species (Kitchener

			McDERMID ROCK										
	Month		G	G	G	L	S	V	V	V		Month	
S	J	F	10a	5	8	9a	8c	33	34a	38a	S	J	F
T	–	–						T			–	T	–
–	3	6				1	1				–	–	2
–	–	–			2	9	6				9	5	3
3	12	9									–	–	–
–	–	–		4	1				1	1	–	3	4
–	2	1									–	–	–
–	–	2		6							4	1	1
S_1	S_3	S_2			S_1		S_1			S_1	–	S_2	S_1
–	–	–			S_1				S_1		S_1	S_1	–
–	–	2	1							1	–	–	2
–	–	S_3									–	–	–
–	7	1	1						1	4	3	2	1
1	7	6	1						1		1	–	1
–	1	3		1							–	1	–
–	–	–	1								–	1	–
–	–	–								1	–	1	–
					N								
1	20	–	14	1	5		1			2	4	10	9
3	7	4			1		7				–	4	4
1	–	–									–	–	–
–	–	–								1	–	–	1
			C										
			C										
			C										
–	S_2	S_1	S_3		S_1				S_1		S_1	S_2	–

et al. 1983); similarly, the specimen of *Pseudomys bolomai* from McDermid Rock represents the south-westerly range limits of this species. The dasyurid *Sminthopsis gilberti* is at its north-eastern limit at Lake Cronin (Kitchener *et al.* 1984) as is the macropod *Macropus irma* at Frank Hann National Park.

The majority of gound-dwelling small mammals were recorded in relatively low numbers; however, with similar trapping effort being applied in each sample site some indication of habitat preference can be gained from this survey.

The occurrence of *Sminthopsis granulipes* in mallees as well as the floristically rich heaths on the extensive Sandplain landform has important conservation implications as this species is listed as rare or otherwise in need of special protection. The dasyurid *Ningaui yvonneae* was most abundant in mallee/*Triodia* at Lake Cronin. However, it was also recorded in several different habitats at both Lake Cronin and McDermid Rock. Two ecologically similar species, *Sminthopsis gilberti* and *S. dolichura,* appear to favour heavier loamy soils than their congeners *S. crassicaudata* and *S. granulipes* which occur on clays and sands respectively within the Study Area. Western Grey Kangaroos, *Macropus fuliginosus,* were widespread and appear to be sighted more frequently during winter months as were rabbits, *Oryctolagus cuniculus.* The Brush Wallaby, *M. irma* was rarely sighted in the Study Area. No tracks of small macropods or the characteristic diggings of bandicoots were observed during the survey.

The recent work of Baynes (pers. comm.) on the original mammal fauna of the south of the Study Area, has shown that numerous species not recorded by this survey were identifiable from skeletal remains in superficial cave deposits. Examining cave deposits at Peak Charles that contained both *Oryctolagus cuniculus* and *Mus domesticus* (both introduced since European settlement) he recorded the dasyurids *Phascogale calura* and *Parantechinus apicalis,* the bandicoots *Perameles bougainville* and *Isoodon obseulus,* the possum *Trichosurus vulpecula,* the macropods *Bettongia penicillata* and *Petrogale lateralis,* and the rodents *Pseudomys shortridgei, Leporillus apicalis* and *Rattus fuscipes.* The contemporaneous occurrence of European introductions and so many species not recorded by this survey is indicative of the great changes that have occurred in the mammal fauna in the last 100 years.

Table 17 Mammals at Frank Hann (FH) and Peak Charles (PC) National Park survey areas indicating number trapped in each sample site. Data is presented in same manner as Table 16. Vegetation types are listed in Tables 7 and 8 and described in Appendix III. Survey periods were March 1980, November 1980 and September 1981.

	FRANK HANN											PEAK CHARLES							
Landform Unit	**S**	**S**	**S**	**S**	**S**	**V**	**V**		**Month**			**G**	**HG**	**V**	**V**	**V**	**Month**		
Vegetation Code (LH)	**17**	**19a**	**21**	**21**	**27**	**34b**	**21a**	**Other**	**M**	**N**	**S**	**9**	**3a**	**45a**	**20a**	**34c**	**M**	**N**	**S**
TACHYGLOSSIDAE																			
Tachyglossus aculeatus			T																
DASYURIDAE																			
Dasyurus geoffroii								1	–	–							–	–	–
Sminthopsis granulipes	2	3	4		7				4	10	2	1			4		–	4	1
S. gilberti			1						–	1	–						–	–	–
BURRAMYIDAE																			
Cercartetus concinnus				1					1	–	–	2	1			1	3	1	–
TARSIPEDIDAE																			
Tarsipes rostratus					2				–	2	–	1		1			1	1	–
MACROPODIDAE																			
Macropus fuliginosus			S_2			S_1	S_1		–	S_2	S_2	S_1			S_1		–	S_1	–
M. irma								1	–	–	1						–	–	–
M. robustus																			
MOLOSSIDAE																			
Mormopterus planiceps		1				4			1	4	–						–	–	–
Tadarida australis						1			1	–	–			1			–	1	–
VESPERTILIONIDAE																			
Chalinolobus gouldii						1		1	1	1	–						–	–	–
C. morio								3	–	3	–						–	–	–
Eptesicus regulus						1			1	–	–			1			–	1	–
MURIDAE																			
Mus domesticus					2	1			3	–	–		2	1	1		4	–	–
Notomys mitchellii		2		1					1	1	1	6		11			6	7	4
Pseudomys albocinereus	3								3	–	–				7		4	3	–
CANIDAE																			
Canis familiaris																T			
Vulpes vulpes																			
FELIDAE																			
Felis catus													S_1						
LEPORIDAE																			
Oryctolagus cuniculus									–	–	–		S_1				–	–	S_1