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A VERTEBRATE FAUNA SURVEY OF THE KEMERTON AREA, WESTERN AUSTRALIA.

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C O N T E N T S

SUMMARY

Eighty-one species of bird, four native mammals, seven amphibians and eighteen reptiles were recorded during this survey. These results were gathered by systematically sampling, with a variety of techniques, the six major vegetation and soil types in the area which were defined during a concurrent vegetation study. Inventory data on fauna were gathered throughout the study area.

It was found that the faunal assemblages of the area grouped into two main types: species primarily associated with wetlands, and species associated with woodlands. The wetland assemblages sub-divided into species with an affinity for deep, permanent swamps and those adapted to shallow, ephemeral swamps (mainly birds). Woodland sites had very little to distinguish one from the other since most species were, or are predicted to be, common to all. This aligns with other studies in the forested areas of the South-West where differences between the fauna of various forest types are only apparent on the grossest level e.g. a comparison between stream-zones and the tops of ridges. The fauna of the forested portions of the Kemerton area can be therefore regarded as a woodland continuum since changes in topography and vegetation structure are not great enough to influence the fauna present.

In order to place the Kemerton area in a regional context, the combined data from this survey and two previous studies were compared with survey data available for two other areas on the southern Coastal Plain (two reserves in Harvey Shire, Benger Swamp) and four areas in the southern portion of the western Darling Range (Serpentine/Jarrahdale, Samson/Willowdale - both Alcoa of Australia leases, the Worsley Refinery lease near Collie and an alternative smelter site also near Collie). The major distinguishing feature of the Kemerton site was its waterbird species richness (thirty-seven species with the addition of previous survey results). Benger Swamp was the

richest area with sixty species. This area, however, has been surveyed over a period of ten years and includes fourteen species of migratory wading bird. Only three were recorded at Kemerton. However, it is predicted that the wading bird total for the study area will rise substantially when the water in the shallow swamp off Marriot Road begins to recede in mid-summer.

Data for the southern Coastal Plain and western Darling Range indicates that their faunas are very similar with only a few species restricted to one or the other. The Kemerton area supports several species of fauna which are restricted to the southern Coastal Plain and as such is representative of the area as a whole. There is no single feature, or combination of features, which set it apart from similar locations on the coastal plain. All species found there, or predicted from the area, are represented elsewhere. Locations which have not been subjected to the amount of clearing and grazing which has taken place at Kemerton are liable to be more productive.

No fauna gazetted as "rare, or otherwise in need of special protection" have been recorded at Kemerton. However, the area falls within the geographic range of several gazetted species.

The most important conservation aspect of the Kemerton area is its capacity to act as a waterbird refuge - a diminishing resource in the South-West of Western Australia.

1.0 INTRODUCTION

This report was commissioned by the Department of Conservation and Land Management (CALM) and provides an assessment of the vertebrate fauna of the Kemerton area approximately 15 km north-east of Bunbury, Western Australia.

The Kemerton site and an area of land near Collie, to the south-east, were originally proposed as possible alternative sites for a primary aluminium smelter planned by the International Aluminium Consortium of Western Australia. As part of an Environmental Review and Management Programme the vertebrate fauna of the Collie site was assessed by Ninox Wildlife Consulting in 1984. Nichols (1980) and Bamford and Watkins (1983) surveyed the Kemerton site. Studies were also conducted of the biophysical environment, economic and social factors and the effects of gaseous and particulate fluoride emission. It was decided that the Kemerton location was the most suitable site for the smelter. Subsequent to this decision the project was shelved indefinitely.

The fauna of the southern Coastal Plain and indeed the adjacent Darling Scarp are relatively poorly known when comparisons are made with more remote areas such as the Western Australian Goldfields, Kimberley and desert regions. Prior to 1970 the bulk of the literature on the area consisted of basic species lists for particular locations and single species studies. Very little information existed on the distribution of fauna through the many soil and vegetation types of the area. This situation probably developed through partitioning of the various areas of responsibility allotted to government departments and differing opinions on long-term objectives. With the advent of bauxite mining in the Darling Range and increased utilisation of the southern Coastal Plain, the paucity of information on the area became apparent. Strengthened legislation requiring development companies to present Environmental Review and Management Programmes (ERMP) and Environmental Impact Statements (EIS)

improved this situation significantly and a body of data on the area began to accumulate. Publication of the System 6 Study Report (DCE, 1983) rationalised this process and a coherent plan of long-term objectives resulted.

1.1 STUDY OBJECTIVES

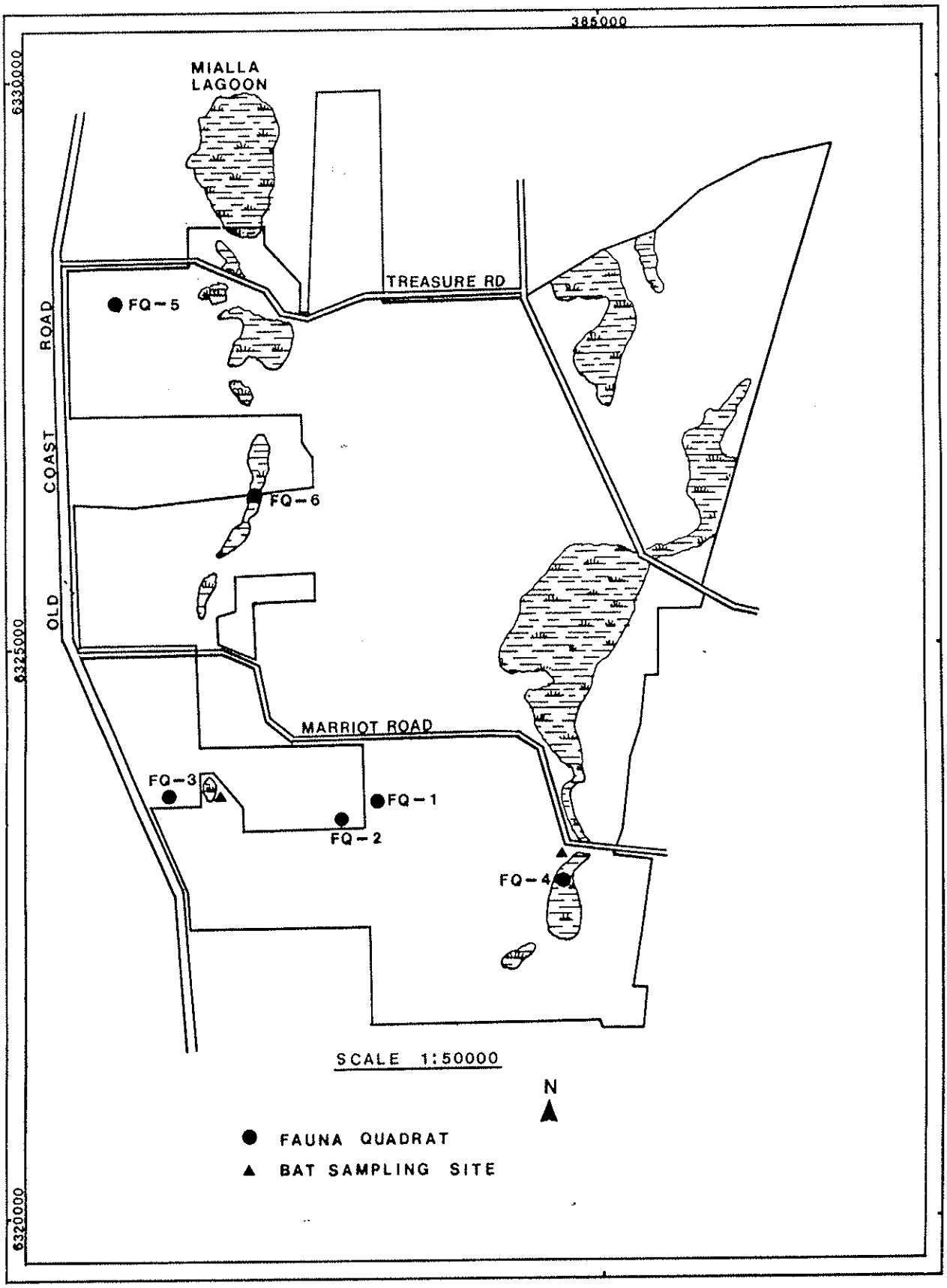
In accordance with the above, this study was structured by CALM to provide:

- baseline data on the vertebrate fauna of the Kemerton area with the object of providing information for immediate land-use decisions and in the longer term, information suitable for management and monitoring.

- data on the vertebrate assemblages found in each of the major vegetation/soil types of the study area.

- an appraisal of the vertebrate assemblages interpreted in a regional perspective.

FIGURE 1 DIAGRAM OF KEMERTON AREA SHOWING LOCATION OF FAUNA QUADRATS AND MAIN FEATURES



2.0 METHODS

Six Fauna Quadrats (FQ) were chosen after discussion with a consultant botanist who was conducting contemporaneous vegetation studies. Each FQ was representative of one of the major vegetation and soil types in the study area (see Figure 1 for locations) and was situated adjacent to a vegetation study plot. Census sampling took place in these areas. Inventory sampling was conducted in equivalent vegetation types throughout the study area. All fauna recorded in FQ's by both these sampling methods are listed in the quadrat sheets included in Appendix 2. These sheets represent, therefore, the current assemblage lists for Kemerton.

The data presented here are the results of a field survey of the Kemerton area which took place from October 17-25, 1985. Census sampling extended over five consecutive days within this period and was carried out by a team of three field staff. A summary of FQ codes, aspect, vegetation community and sampling effort is given in Tables 1a & b.

2.1 BIRDS - FIELD DATA COLLECTION

2.1.1 Census sampling

Census sampling for birds centred on six quadrats each approximately 10,000 square metres in area. Two observers were rotated on a daily basis over a five-day sampling period and each quadrat visited at a later time each day. Variations in observer bias, weather conditions and peak activity periods were thus minimised. One hour per day was spent in each quadrat between the hours of 0730 and 1200. Where vegetation types were narrow, i.e. ridge tops and swamp edges, the quadrats were sampled as narrow corridors; ecotonal situations were avoided. All data were logged directly onto coded field data sheets.

2.1.2 Inventory sampling

Opportunistic bird records were compiled on microcassette recorders while travelling between FQs or conducting work related to other faunal groups. Nocturnal species were noted during spot-lighting runs by vehicle throughout the study area (see Section 2.2.1), or during head-torching of foot-transects through each FQ. Taped inventory data were subsequently logged onto coded data sheets.

2.2 MAMMALS, REPTILES AND AMPHIBIANS - FIELD DATA COLLECTION

2.2.1 Census sampling

Terrestrial fauna was sampled in five of the six FQs. FQ-6, a permanent swamp, was located in cleared farmland and the water-table extended too far beyond the fringing vegetation to allow pit-traps to be sunk in the same vegetation type. This site was chosen specifically for birds since it was one of the few examples of a deep permanent swamp in the study area. The condition of the land indicated that it would be depauperate in terrestrial fauna.

Two 50 m drift fences 20 cm high, each connecting six poly-pipe pit-traps 125 mm OD x 50 cm deep were established in each quadrat. Twenty medium Elliott traps (32 x 10 x 10 cm) and one Tomahawk wire cage trap (66 x 25 x 25 cm) were also used. Traps were baited with universal bait and left in position for five days.

2.2.2 Inventory sampling

Opportunistic mammal, reptile and amphibian records were compiled on microcassette recorders while travelling between FQs, or while sampling birds. Data were subsequently transcribed onto coded data sheets. One three-hour spotlight run was conducted in the study area and covered all representative vegetation types. Bats were sampled only where a concentrating

effect occurred, e.g. watering points and flyways; mist nets and an automatic bat trap were used. Two sixty-foot mist nets were set at a given point and manned for a minimum of 1.5 hrs after dark. The bat trap was left in position for three days then moved to another site. Sampling stations are marked in Figure 1.

TABLE 1a Summary of the topographical locations and vegetation communities of the Fauna Quadrats of the Kemerton area. Vegetation codes may be expanded by reference to the vegetation report.

FQ CODE	TOPOGRAPHICAL LOCATIONS	VEGETATION COMMUNITY	VEGETATION CODE
FQ-1	Crest of ridge	Low forest of Eucalyptus decipiens with Agonis flexuosa and Banksia attenuata over mixed low scrub and heath.	2
FQ-2	Upper slopes	Open low woodland of sparse Banksia attenuata and occasional Eucalyptus marginata over a heath with Allocasuarina humilis and dwarf scrub.	6
FQ-3	Lower slopes	Forest to low forest of Eucalyptus marginata over open low woodland of Banksia attenuata and B. grandis over low scrub and low heath.	5
FQ-4	Drainage line	Open low woodland of Melaleuca priessiana and Eucalyptus rudis over dense heath of Pericalymma ellipticum over open herbs.	14
FQ-5	Low ridge	Woodland of Eucalyptus gomphocephala over low forest of Agonis flexuosa over dwarf scrub.	1
FQ-6	Drainage line	Open woodland to dense low forest A of Eucalyptus rudis, Melaleuca preissiana and Acacia saligna over dense thickets of M. teretifolia and reeds.	12

TABLE 1b Summary of techniques used and sampling effort in the Fauna Quadrats of the Kemerton area.

FAUNA QUADRAT CODE	1	2	3	4	5	6
VEGETATION CODE	2	6	5	14	1	12
ACTIVITY						
Pit trap (no. of nights)	60	60	60	60	60	0
Elliott trap ..	100	100	100	100	100	0
Cage trap ..	5	5	5	5	5	0
Total number of trap-nights	165	165	165	165	165	0
Headtorching (no. of hours)	1.5	1.5	1.5	1.5	1.5	0
Hand foraging ..	1.5	1.5	1.5	1.5	1.5	0
Bird observation ..	5	5	5	5	5	5

3.0 RESULTS

TABLE 2a Tabulation of bird census sampling in the vegetation communities of the Kemerton area. Vegetation Codes may be expanded by reference to Table 1a or the report on the vegetation.
Breeding = *

STUDY AREA	KEMERTON					
FAUNA QUADRAT NUMBER	1	2	3	4	5	6
VEGETATION CODE	2	6	5	14	1	12
BIRDS						
STRUTHIONIFORMES CASUARIIDAE						
Dromaius novaehollandiae, Emu	1	1				
PODICIPEDIFORMES PODICIPEDIDAE						
Podiceps novaehollandiae, Black-throated Grebe				3		3
P. poliocephalus, Hoary-headed Grebe						20
PELECANIFORMES PELECANIDAE						
Pelecanus conspicillatus, Australian Pelican						1
PHALACROCORACIDAE						
Phalacrocorax sulcirostris, Little Black Cormorant				1		12*
P. varius, Pied Cormorant						4
P. melanoleucos, Little Pied Cormorant				7		6
Anhinga melanogaster, Darter						43*
ARDEIFORMES ARDEIDAE						
Ardea pacifica, Pacific Heron				8		
A. novaehollandiae, White-faced Heron				19		
THRESKIORNITHIDAE						
Threskiornis aethiopicus, Sacred Ibis						34
T. spinicollis, Straw-necked Ibis						2

TABLE 2a - Cont.

STUDY AREA	KEMERTON					
FAUNA QUADRAT NUMBER	1	2	3	4	5	6
VEGETATION CODE	2	6	5	14	1	12
BIRDS						
ANSERIFORMES ANATIDAE						
Cygnus atratus, Black Swan				3*		17*
Tadorna tadornoides, Mountain Duck				50*		
Anas superciliosa, Black Duck				101*		7
A. gibberifrons, Grey Teal				18		3
A. rhynchotis, Blue-winged Shoveller				20		
Chenonetta jubata, Wood Duck						11*
Oxyura australis, Blue-billed Duck						1
Biziura lobata, Musk Duck						10
ACCIPITRIFORMES ACCIPITRIDAE						
Lophoictinia isura, Square-tailed Kite	1				1	
Accipiter fasciatus, Brown Goshawk						1
Aquila morphnoides, Little Eagle		1				
A. audax, Wedge-tailed Eagle					1	1
Circus aeruginosus, Marsh Harrier				1		
FALCONIDAE						
Falco longipennis, Australian Hobby						1
GRUIFORMES RALLIDAE						
Porphyrio porphyrio, Swamphen				1		1
Gallinula ventralis, Black-tailed Native Hen				1		
Fulica atra, Coot						16*
CHARADRIIFORMES CHARADRIIDAE						
Charadrius melanops, Black-fronted Plover				12		
SCOLOPACIDAE						
Calidris ferruginea, Curlew Sandpiper						1
RECURVIROSTRIDAE						
Himantopus himantopus, Black-winged Stilt				38		

TABLE 2a - Cont.

STUDY AREA	KEMERTON					
FAUNA QUADRAT NUMBER	1	2	3	4	5	6
VEGETATION CODE	2	6	5	14	1	12
BIRDS						
PSITTACIFORMES PSITTACIDAE						
Glossopsitta porphyrocephala, Purple-crowned Lorikeet		1				
Platycercus zonarius, Ring-necked Parrot	1		1		1	2
P. spurius, Red-capped Parrot	1	3	2			3
Calyptorhynchus baudinii, Baudin's Cockatoo	3	3	1		1	
CUCULIFORMES CUCULIDAE						
Cuculus flabelliformis, Fan-tailed Cuckoo	1				1	
Chrysococcyx basalis, Horsfield's Bronze Cuckoo	3	1				
C. lucidus, Shining Bronze Cuckoo	1	1	1			
CORACIIFORMES ALCEDINIDAE						
Dacelo gigas, Laughing Kookaburra	2	1		1		
Halcyon sancta, Sacred Kingfisher			2		4	2
MEROPIDAE						
Merops ornatus, Rainbow Bee-eater		5	13			
PASSERIFORMES HIRUNDINIDAE						
Hirundo neoxena, Welcome Swallow				18		31
H. nigricans, Tree Martin		4		54	7	31
CAMPEPHAGIDAE						
Coracina novaehollandiae, Black-faced Cuckoo-shrike	2	3			1	2
PACHYCEPHALIDAE						
Petroica multicolor, Scarlet Robin		3	7*		2*	
Eopsaltria australis, Yellow Robin					3	
Pachycephala pectoralis, Golden Whistler	8	2	6	1	8	
P. rufiventris, Rufous Whistler	1	5	1	1	1	2

TABLE 2a – Cont.

STUDY AREA	KEMERTON					
FAUNA QUADRAT NUMBER	1	2	3	4	5	6
VEGETATION CODE	2	6	5	14	1	12
BIRDS						
Colluricincla harmonica, Grey Shrike-thrush		3	4		4	
MONARCHIDAE						
Rhipidura fuliginosa, Grey Fantail	10	2	14	2	25	10
R. leucophrys, Willie Wagtail				1		18
ACANTHIZIDAE						
Gerygone fusca, Western Flyeater	11	3	16	2	16	1
Acanthiza apicalis, Broad-tailed Thornbill	10	9	1	4	10	3
A. inornata, Western Thornbill		13	2			
A. chrysorrhoa, Yellow-rumped Thornbill		6	8	2		
Sericornis frontalis, White-browed Scrub-wren						2
MALURIDAE						
Malurus splendens Splendid fairy-wren				14		11
SYLVIIDAE						
Acrocephalus stentoreus, Clamorous Reed Warbler						6
Megalurus gramineus, Little Grassbird				17		5
DAPHOENOSITTIDAE						
Daphoenositta chrysoptera, Australian Sittella		2	8			
PARDALOTIDAE						
Pardalotus punctatus, Spotted Pardalote	1				2	
P. striatus, Striated Pardalote	9	16	21	5	22	
ZOSTEROPIDAE						
Zosterops lateralis, Grey-breasted White-eye	3		7	16		11
MELIPHAGIDAE						
Lichmera indistincta, Brown Honeyeater	5	5	4		4	3
Acanthorhynchus superciliosus, Western Spinebill	6	4	2	2	2	

TABLE 2a - Cont.

STUDY AREA	KEMERTON					
FAUNA QUADRAT NUMBER	1	2	3	4	5	6
VEGETATION CODE	2	6	5	14	1	12
BIRDS						
Anthochaera carunculata, Red Wattlebird	12	7	2		19	4
ARTAMIDAE						
Artamus cyanopterus, Dusky Woodswallow						1
CRACTICIDAE						
Cracticus torquatus, Grey Butcherbird			1			
C. tibicen, Australian Magpie	1		1			
Strepera versicolor, Grey Currawong			1			
CORVIDAE						
Corvus coronoides, Australian Raven	12	6	9	3	10	2
Total number of species per site	23	26	25	31	22	40

TABLE 2b Tabulation of mammal census sampling in the vegetation communities of the Kemerton area. Vegetation codes may be expanded by reference to Table 1a or the report on the vegetation.
* = introduced; S = scats; T = tracks

STUDY AREA	KEMERTON				
FAUNA QUADRAT NUMBER	1	2	3	4	5
VEGETATION CODE	2	6	5	14	1
MAMMALS					
PHALANGERIDAE					
Trichosurus vulpecula, Common Brushtail Possum	1				
BURRAMYIDAE					
Cercartetus concinnus, Western Pygmy-possum	1				
MACROPODIDAE					
Macropus irma, Western Brush Wallaby		T	T,S		
M. fuliginosus, Western Grey Kangaroo	3		T	T	2
MURIDAE					
Rattus rattus, Black Rat*				2	
Mus musculus, House Mouse*		1		3	
LEPORIDAE					
Oryctolagus cuniculus, Rabbit*				T,S	
CANIDAE					
Vulpes vulpes, Fox*				1+T	
Total number of species per site	3	2	2	5	1

TABLE 2c Tabulation of amphibian and reptile census sampling in the vegetation communities of the Kemerton area. Vegetation Codes may be expanded by reference to Table 1a or the report on the vegetation.

STUDY AREA		KEMERTON				
FAUNA QUADRAT NUMBER		1	2	3	4	5
VEGETATION CODE		2	6	5	14	1
AMPHIBIANS AND REPTILES						
LEPTODACTYLIDAE	Ground Frogs					
Heleioporus eyrei		1	4	1		2
Limnodynastes dorsalis		1				
Pseudophryne guentheri					1	
Ranidella insignifera					>212	
HYLIDAE	Tree Frogs					
Litoria moorei					3	
GEKKONIDAE	Geckos					
Phyllodactylus marmoratus		4	2	5	1	3
PYGOPODIDAE	Legless Lizards					
Lialis burtonis			1			
AGAMIDAE	Dragons					
Pogona m. minor			1			
SCINCIDAE	Skinks					
Cryptoblepharus plagiocephalus			1	1	6	
Ctenotus impar					1	
Egernia napoleonis		1				
Hemiergis peronii quadrilineata		3	4		4	4
Leiolopisma trilineatum					4	
Lerista distinguenda			3			2
Menetia greyii					3	
Morethia lineoocellata		3	8	4		4
Tiliqua r. rugosa		2	2		3	

TABLE 2c - Cont.

STUDY AREA		KEMERTON				
FAUNA QUADRAT NUMBER		1	2	3	4	5
VEGETATION CODE		2	6	5	14	1
AMPHIBIANS AND REPTILES						
VARANIDAE	Monitors					
Varanus rosenbergi		1				
TYPHLOPIDAE	Blind Snakes					
Ramphotyphlops australis		1				
ELAPIDAE	Front-fanged Venomous Snakes					
Notechis scutatus occidentalis					3	
Total number of species per site		9	9	4	11	6

TABLE 3 Inventory list of fauna not recorded during census sampling of individual Fauna Quadrats or recorded during inventory sampling only.
Species from cleared farmland (FL) and an adjacent small Agonis flexuosa thicket (Ag) are included.

STUDY AREA		KEMERTON							
VEGETATION CODE		2	6	5	14	1	12	FL	Ag
BIRDS									
STRUTHIONIFORMES	CASUARIIDAE								
Dromaius novaehollandiae,	Emu				X			X	
ARDEIFORMES	ARDEIDAE								
Ardea novaehollandiae, White-faced Heron							X		
Nycticorax caledonicus, Rufous Night Heron							X		
ACCIPITRIFORMES	ACCIPITRIDAE								
Accipiter cirrocephalus, Collared Sparrowhawk		X							
Circus aeruginosus,	Marsh Harrier						X		
	FALCONIDAE								
Falco cenchroides,	Australian Kestrel				X				
GRUIFORMES	RALLIDAE								
Fulica atra,	Coot				X				
COLUMBIFORMES	COLUMBIDAE								
Phaps chalcoptera,	Common Bronzewing							X	
PSITTACIFORMES	PSITTACIDAE								
Glossopsitta porphyrocephala, Purple-crowned Lorikeet		X							
Platycercus zonarius, Ring-necked Parrot					X			X	X
P. spurius,	Red-capped Parrot							X	X
Neophema elegans,	Elegant Parrot			X				X	
STRIGIFORMES	STRIGIDAE								
Ninox novaeseelandiae,	Boobook Owl	X				X			

TABLE 3 - Cont.

STUDY AREA	KEMERTON							
VEGETATION CODE	2	6	5	14	1	12	FL	Ag
BIRDS								
CORACIIFORMES — ALCEDINIDAE								
Halcyon sancta, Sacred Kingfisher							X	
MEROPIDAE								
Merops ornatus, Rainbow Bee-eater								X
PASSERIFORMES — HIRUNDINIDAE								
Hirundo neoxena, Welcome Swallow							X	
H. nigricans, Tree Martin							X	
CAMPEPHAGIDAE								
Coracina novaehollandiae, Black-faced Cuckoo-shrike							X	X
Lalage sueurii, White-winged Triller				X			X	
PACHYCEPHALIDAE								
Petroica goodenovii, Red-capped Robin				X				
P. multicolor, Scarlet Robin							X	
Pachycephala pectoralis, Golden Whistler								X
P. rufiventris, Rufous Whistler							X	X
Colluricincla harmonica, Grey Shrike-thrush	X			X			X	
MONARCHIDAE								
Rhipidura fuliginosa, Grey Fantail							X	X
R. leucophrys, Willie Wagtail							X	
ACANTHIZIDAE								
Gerygone fusca, Western Flyeater							X	
Acanthiza apicalis, Broad-tailed Thornbill							X	X
A. chrysorrhoa, Yellow-rumped Thornbill	X				X		X	X
Sericornis frontalis, White-browed Scrub-wren	X			X				
MALURIDAE								
Malurus splendens Splendid Fairy-wren	X							
PARDALOTIDAE								
Pardalotus striatus, Striated Pardalote							X	X

TABLE 3 - Cont.

STUDY AREA	KEMERTON							
VEGETATION CODE	2	6	5	14	1	12	FL	Ag
BIRDS								
ZOSTEROPIDAE								
Zosterops lateralis, Grey-breasted White-eye							X	
MELIPHAGIDAE								
Lichmera indistincta, Brown Honeyeater				X				
Anthochaera carunculata, Red Wattlebird				X			X	X
GRALLINIDAE								
Grallina cyanoleuca, Magpie-lark							X	
ARTAMIDAE								
Artamus cyanopterus, Dusky Woodswallow	X						X	
CRACTICIDAE								
Cracticus torquatus, Grey Butcherbird				X			X	
C. tibicen, Australian Magpie				X			X	
Strepera versicolor, Grey Currawong	X	X						X
CORVIDAE								
Corvus coronoides, Australian Raven							X	X
MAMMALS								
PHALANGERIDAE								
Trichosurus vulpecula, Common Brushtail Possum								X
MACROPODIDAE								
Macropus fuliginosus, Western Grey Kangaroo		X					X	
LEPORIDAE								
Oryctolagus cuniculus, Rabbit	X						X	
CANIDAE								
Vulpes vulpes, Fox	X							

TABLE 3 - Cont.

STUDY AREA		KEMERTON							
VEGETATION CODE		2	6	5	14	1	12	FL	Ag
AMPHIBIANS AND REPTILES									
LEPTODACTYLIDAE	Ground Frogs								
Ranidella glauerti					X		X		
HYLIDAE	Tree Frogs								
Litoria adelaidensis					X		X		
CHELONIIDAE	Tortoises								
Chelodina oblonga							X		
AGAMIDAE	Dragons								
Pogona m. minor		X							
SCINCIDAE	Skinks								
Cryptoblepharus plagiocephalus						X			
Ctenotus impar			X						
Egernia napoleonis			X						
Lerista distinguenda				X					
Tiliqua r. rugosa									X
TYPHLOPIDAE	Blind Snakes								
Ramphotyphlops australis			X						
ELAPIDAE	Front-fanged Venomous Snakes								
Pseudonaja a. affinis			X						

3.1 APPRAISAL OF INDIVIDUAL ASSEMBLAGES

Eighty-one species of bird, four native mammals, seven amphibians and eighteen reptiles were recorded during this survey. Census sampling in the major vegetation types returned seventy-two species of bird, four native mammals, five amphibians and fifteen reptiles (Tables 2a, 2b, 2c).

In the broadest sense the individual faunal assemblages in the Kemerton area divide into two types: wetlands (FQ-4, FQ-6) and woodlands (FQ-1, FQ-2, FQ-3, FQ-5). The wetlands are defined primarily by a large number of waterbirds and several habitat specific amphibians and reptiles such as Pseudophryne guentheri, Ranidella insignifera, Litoria moorei, Leiolopisma trilineatum and Notechis scutatus occidentalis. Woodlands are defined mainly in a negative sense: all the waterbirds, amphibians and reptiles noted above are absent.

The two wetland quadrats (FQ-4, FQ-6) differ from one another in that FQ-4 is a shallow ephemeral swamp and FQ-6 is deeper and permanent. As a result FQ-6 supports a preponderance of species adapted to deeper water: Australian Pelican Pelecanus conspicillatus, Little Black Cormorant Phalacrocorax sulcirostris, Pied Cormorant P. varius, Darter Anhinga melanogaster, Black Swan Cygnus atratus, Musk Duck Bizuria lobata. Darters and Black Swans were observed breeding at this location. The surrounding farmland advantages species such as the Sacred Ibis Threskiornis aethiopicus and Straw-necked Ibis T. spinicollis. Fauna Quadrat 4 has greater numbers of species preferring shallower water: Mountain Duck Tadorna tadornoides, Black Duck Anas superciliosa, Grey Teal A. gibberifrons and Blue-winged Shoveller A. rhynchotis. Its shallows also favour species such as: Pacific Heron Ardea pacifica, White-faced Heron A. novaehollandiae, Black-tailed Native Hen Gallinula ventralis, Black-fronted Plover Charadrius melanops and Black-winged Stilt Himantopus himantopus. In combination, these two swamps and other similar locations within the Kemerton area represent a

valuable wetland resource since this type of country is rapidly diminishing throughout the Coastal Plain.

No comparison of mammals and reptiles has been made for these two locations since only FQ-4 was sampled for these groups (see Section 2.2).

There is very little to distinguish the woodland quadrats FQ-1, FQ-2, FQ-3 and FQ-5 from one another in terms of the birds present in each (Table 2a). The apparent absence of certain species from some Fauna Quadrats after censusing (Table 2a) is in fact misleading since many of these birds were recorded during inventory sampling of similar vegetation (Table 3). Other absences are an artefact of the short duration of the survey and poor weather conditions. Previous work in the forested areas of the South-West (Worsley Alumina, 1985) indicates that differences in avifaunal assemblages occur mainly at the grossest level, e.g. in comparisons between the birds of Wandoo woodland and Jarrah woodland or those of stream zones and the tops of ridges. While further sampling of the Kemerton area could possibly reveal some differences between the lightly and heavily wooded locations, at this stage the woodland sites are best regarded as a continuum.

Mammal, amphibian and reptile data are incomplete and show great variations between Fauna Quadrats. It is probable that the pattern evident in birds will emerge with further sampling, i.e. the Kemerton area will divide into wetlands and a woodland continuum.

4.0 DISCUSSION

4.1 ZOOGEOGRAPHY AND CONSERVATION STATUS OF THE REGION

In any assessment of the significance of an area to fauna it is important that zoogeographic considerations are reviewed. A pioneer in this field was Baldwin Spencer (1896) who recognised three major, distinct, zoogeographic sub-regions in Australia. His concept took into account broad faunal distribution patterns which aligned fairly well with the wetter south-eastern zone of Australia (Bassian Sub-region), the northern, hot, wet, coastal area (Torresian Sub-region), and inland, arid Australia (Eyrean Sub-region).

Spencer's concept was carefully considered by Serventy and Whittell (1976) who examined bird distributions in Western Australia and concluded that there was a need to define a fourth sub-region: the south-western corner of Western Australia where an intermingling of two faunas, the Eyrean and Bassian, occurred. The South-West has a number of bird species identical to those found in southern Victoria but which no longer have a continuous distribution across the continent - the Nullarbor Plain and associated arid coastal strip acting as a barrier. A few species, the Spotted Scrubwren Sericornis maculatus, Australian Raven Corvus coronoides and White-fronted Chat Epthianura albifrons, however, have a narrow corridor of continuous distribution through this barrier. Several species are endemic to the South-West and have no equivalent populations in Eastern Australia. Examples recognised by Serventy and Whittell as being of special significance are: Western Rosella Platycercus icterotis, Red-capped Parrot P. spurius, Baudin's Cockatoo Calyptorhynchus baudinii, White-breasted Robin Eopsaltria georgiana, Red-winged Fairy-wren Malurus elegans, Western Thornbill Acanthiza inornata and Western Spinebill Acanthorhynchus superciliosus.

Consideration has also been given to evaluating the importance of different regions for other faunal groups. Storr (1964) confirmed that the distinctness of the South-West for reptiles paralleled the situation previously indicated for birds and believed that geographical influences (especially the presence of a large belt of forest-covered laterite) explained some of the speciation which had occurred in reptiles and frogs. The discontinuous distributions of some reptiles and birds from the Western Australian Wheatbelt to the east and the Swan Coastal Plain to the west can also be attributed to this feature. In examining the distribution patterns of south-western reptiles Chapman and Dell (1984) concluded that a south-western sub-region encompassing the area south of a line from Shark Bay to Israelite Bay was not valid, since many species with wide distributions in arid Australia extended well to the west and south of this line. They instead drew attention to a much smaller region within the South-West. This area has a number of mesio-temperate elements from south-eastern Australia, as well as a significant number of endemic species. Examples of the latter are: Sphenomorphus australis, Leiolopisma trilineatum, Diplodactylus polyophthalmus, Ctenotus labillardieri, C. delli, several snakes from the genera Notechis and Rhinoplocephalus and the frog genera Crinia and Ranidella. The conclusions of Chapman and Dell (1984) are reflected in the map presented by Horton (1972) in his concept of zoogeographic sub-regions.

Several mammals are endemic to the South-West. In some cases they do not fit into the South-Western Sub-Region outlined for reptiles but have a larger distribution defined by the line from Shark Bay to Israelite Bay. Examples of these are: Brush Wallaby Macropus irma, Honey Possum Tarsipes rostratus and Southern Bush-rat Rattus f. fuscipes. Others are restricted to the South-Western Sub-Region either because of their specialised habitat requirements (Western Ringtail Possum Pseudocheirus peregrinus occidentalis, Quokka Setonix brachyurus, the Dunnart Sminthopsis griseoventer), or because their geographic range has contracted (Dibbler Parantechinus apicalis, Western Quoll Dasyurus geoffroii).

Heavier rainfall coupled with a higher clay content in the soil, has resulted in denser understoreys in the southern portion of the Darling Sub-Region in the South-West Botanical Province (Beard, 1977). This, and other influencing factors, has produced a fauna peculiarly adapted to an unique environment (Mulchahy, 1980). The South-West of Western Australia, particularly the heavier forested portion, is therefore an area of great zoogeographical significance and a number of species have evolved in its mesio-temperate environment which provided refuge as the continent became increasingly arid. Its proximity to large centres of population, the presence of valuable mineral deposits and timber resources, however, has placed its very limited area under ever-increasing development pressure.

4.2 REGIONAL APPRAISAL OF THE KEMERTON AREA

The results of this survey are the product of a short, single season survey in spring 1985. Data on the area has been augmented by information collected by Bamford and Watkins (1983) and is presented in Appendix 1. Their survey took place in late spring 1982 and early autumn 1983. While spring and autumn are the optimal periods in which to conduct a survey in the South-West, the inventory list and configurations of faunal assemblages presented should not be regarded as definitve but rather as their provisional status pending further fauna studies. Local and regional movements of birds, the effect of ambient temperature on reptiles and the breeding seasons of mammals can combine to produce an incomplete picture of an area. This was evident during this survey when low temperatures affected mammal and reptile trap returns; strong winds hindered bird sampling and the inventory of wading birds was incomplete due to the earliness of the season. Within these limitations the following regional comparisons can be made.

The study area has been compared with six other locations in the region for which fauna inventory lists are available (Appendix 1). On the southern Coastal Plain the area chosen extends from Yarloop to Brunswick Junction and includes lists from the following sources: Youngson and Henry (1983), Sedgwick (1973, 1977). On the western Darling Range the area extends from Jarrahdale to Collie and includes data from Nichols et al. (1981), Worsley Alumina (1985), Youngson and Henry (1984).

Birds

It is immediately apparent from Appendix 1 that the Kemerton area and the Coastal Plain sites are rich in waterbirds, while the locations in the western Darling Range support very few. This reflects the relative lack of wetlands in the latter sites. Species which do occur in the Range are in general opportunistic waterbirds with unspecialised habits. Of the 62 waterbirds and associated species (e.g. Marsh Harrier, Straw-necked Ibis, Magpie-lark) recorded on the Coastal Plain wetlands, the Kemerton site supports 37. While this total appears to be low it is only so in a relative sense since the Benger Swamp results (60 species) overshadow all other locations. Benger Swamp was surveyed by E. Sedgwick from 1965 to 1976 which accounts for the size of the list. A more realistic comparison can be made with the twelve-day survey of two reserves near Harvey conducted by Ninox Wildlife Consulting for DCE in 1983. Nineteen waterbird species were recorded during this survey. The wetlands on these reserves were very small and shallow compared to those in the Kemerton area and as a result waterbird species richness is much lower. The total of waterbirds recorded in the Kemerton area can be expected to rise with further seasonal survey work. Many more wading birds should appear in the area when the shallow swamp at FQ-4 partially dries out in summer.

Eleven raptors are included in Appendix 1 all of which have been recorded on the Coastal Plain. Only seven have been found on the western Darling Range sites. The four species missing from the Range sites are, in general, birds of prey with a preference for

lightly timbered areas, swamps or open farmland. The Kemerton area supports more species of raptor than all other locations in Appendix 1 possibly because of the greater range of habitats present.

Appendix 1 indicates that Carnaby's Cockatoo, Red-tailed Black Cockatoo and Tawny Frogmouth are absent from Kemerton and the Coastal Plain sites. Distribution maps in Blakers et al. (1984), however, show that these species have been recorded along the coast. The apparent absence of these birds probably represents a preference for more heavily timbered country or in the case of the Tawny Frogmouth a vagary of sampling.

The passerine birds listed are, in general, widespread throughout both the Coastal Plain and the western Darling Range. Exceptions are species with a discontinuous east-west distribution due to a tendency to avoid the denser forested country of the Darling Range: White-winged Triller, Red-capped Robin, Hooded Robin; or species primarily restricted to the densely vegetated stream-zones of the Range: White-breasted Robin, Red-winged Fairy-wren, Red-eared Firetail. The restriction to the Range of other species e.g. Rufous Tree-creeper, White-naped Honeyeater, Little Wattlebird is probably only apparent, reflecting the lack of broad-scale systematic survey work rather than their actual absence from Kemerton and the Coastal Plain sites.

Mammals

The lack of survey work on the southern Coastal Plain is never more apparent than in the list of mammals. Appendix 1 shows that of the 14 terrestrial species recorded by surveys in the Coastal Plain and adjacent Darling Range only five were from the former. W.A. Museum records (Kitchener and Vicker, 1981), however, show that all the species listed have been recorded on the southern Coastal Plain. Two of these, the Quokka Setonix brachyurus and the Numbat Myrmecobius fasciatus were recorded in 1928 and 1944 respectively, and probably no longer occur there. The Western Ringtail Possum Pseudocheirus peregrinus occidentalis and the

Southern Bushrat Rattus f. fuscipes are two further species listed in Museum records as being present on the southern Coastal Plain. The Kemerton area is therefore potentially richer in terrestrial mammals than indicated by survey results.

Bats have been excluded from Appendix 1 since specific localities for the Alcoa collecting sites are not given. The following is a list of species recorded in the western Darling Range and southern Coastal Plain. Adverse weather conditions resulted in no bats being recorded during this survey; bats recorded during previous work at Kemerton are marked with an asterisk: White-striped Mastiff-bat Tadarida australis, Little Mastiff-bat Mormopterus planiceps, Greater Long-eared Bat Nyctophilus major*, Lesser Long-eared Bat N. geoffroyi*, Gould's Wattled Bat Chalinolobus gouldii*, Chocolate Wattled Bat C. morio, Great Pipistrelle Pipistrellus tasmaniensis*, King River Eptesicus Eptesicus regulus*.

Until further information is available any definitive regional comparisons of the mammals of Kemerton, the southern Coastal Plain and western Darling Range are perhaps premature. However, it appears from the records to hand that there is little to distinguish the suites of species. One exception is the Western Ringtail Possum Pseudocheirus peregrinus occidentalis, which has a south-coastal distribution following the Peppermint Agonis flexuosa belt. This species could be present at Kemerton.

Amphibians

Appendix 1 shows that 12 amphibians have been recorded in surveys of the southern Coastal Plain and western Darling Range. Nine have been recorded in the Kemerton area. The remaining three species, Heleioporus barycragus, H. inornatus and Ranidella pseudinsignifera are restricted to the Darling Range. R. insignifera is the only species restricted to the Coastal Plain. Litoria moorei, despite its absence from the western Darling Range sites in Appendix 1 does occur there (Tyler et al., 1984).

Reptiles

The list of reptiles for the western Darling Range and southern Coastal Plain while also incomplete and showing misleading gaps e.g. the absence of Diplodactylus polyophthalmus, Phyllurus millii, Rhinoplocephalus gouldii from the Coastal Plain and Ctenotus impar, Notechis coronatus from the Range, is more open to regional definition. W.A. Museum records show that many of the species not recorded during surveys actually occur in the areas. Most of the species listed in Appendix 1 are common to both the western Darling Range and southern Coastal Plain, but several species in each tend to define their locations since they are restricted to one or the other. Western Darling Range: Ctenotus delli, Egernia p. pulchra, Hemiergis i. initialis, H. p. peronii, Morethia obscura, Sphenomorphus australis, Aprasia pulchella and Acanthopis antarcticus. Southern Coastal Plain: Pygopus lepidopodus, Hemiergis peronii quadrilineata, Morethia lineoocellatus. The latter two species were recorded at Kemerton and assist in defining the area a typical southern Coastal Plain site.

Overview of the area

In summation, the Kemerton site is representative of the southern Coastal Plain since it supports elements of the small suite of species which distinguish this area from the adjacent western Darling Range. It has value as a waterbird refuge since wetlands are a rapidly diminishing resource on the Coastal Plain. Its already large list of waterbirds is expected to increase with further survey work. Apart from the wetlands there is no single feature or combination of features which set the area aside from similar locations in the region. The species lists for mammals and reptiles are as yet incomplete but tend to reflect the wide distribution of these animals on the southern Coastal Plain and adjacent western Darling Range. It is highly probable that the area is richer in terrestrial fauna than indicated by this survey. However, since the area is partially cleared for farmland it is liable to be less productive than areas which have not been subjected to this type of activity.

5.0 GAZETTED SPECIES

No species gazetted as "rare, or otherwise in need of special protection" were recorded during this survey or previous studies of the Kemerton area. Several species, however, have a geographic range encompassing this location. These are: Western Ringtail Possum Pseudocheirus peregrinus occidentalis, Western Native Cat Dasyurus geoffroii, Freckled Duck Stictonetta naevosa, Peregrine Falcon Falco peregrinus, Red-eared Firetail Emblema oculatum. All of these are possibilities for the Kemerton area.

6.0 REFERENCES

Bamford, M. J. and Watkins, D. (1983). Kemerton wetlands: The vertebrate fauna and its regional significance. Internal report to Alcoa of Australia Pty. Ltd.

Beard, J. S. (1977). Phytogeographic Regions. In: Gentilly, J. (ed.) Western Landscapes. Perth. Univ. of W.A. Press. 107-121.

Blakers, M., Davies, S. J. J. F. and Reilly, P. N. (1984). The Atlas of Australian Birds. Melbourne University Press. 738 pp.

Chapman, A. and Dell, J. (1985). Biology and Zoogeography of the Amphibans and Reptiles of the Western Australian Wheatbelt. Rec. West. Aust. Mus. 1985, 12(1): 1-46.

Department of Conservation and Environment (1981). Proposals for Parks and Reserves - The System 6 Study Report to the Environmental Protection Authority. Report 8. Department of Conservation and Environment, Western Australia.

Department of Conservation and Environment (1983). Conservation Reserves for Western Australia as recommended by the Environmental Protection Authority - 1983. The Darling System - System 6. Part II: Recommendations for Specific Localities. Report 13. Department of Conservation and Environment, Western Australia.

Horton, D. (1972). The concept of zoogeographic sub-regions. Systematic Zoology 22 No. 2: 191-195.

Kitchener, D. J. and Vicker, E. (1981). Catalogue of modern mammals in the Western Australian Museum 1895-1981. West. Aust. Mus. Publ. 184 pp.

Mulchahy, M. J. (1980). Atlas of Natural Resources, Darling System, Western Australia. Explanatory Text. Dept. Cons. & Env., Western Australia.

Nichols, O. G. (1980). Kemerton, Pinjarra and Wagerup Fauna Surveys. Alcoa of Australia Pty. Ltd. internal report.

References

Nichols, O. G., Glossp, B. L. and Smurthwaite, A. J. (1981). A method for assessing the likely effects of bauxite mining on conservation of flora and fauna management priority areas. Alcoa of Aust. Ltd. Environmental Research Bulletin No. 12. 59 pp.

Sedgwick, E. H. (1973). Birds of the Benger Swamp. West. Aust. Nat. 12: 147-155.

Sedgwick, E. H. (1977). Further notes on birds of Benger Swamp. West. Aust. Nat. 14: 22-24.

Serventy, D. L. and Whittell, H. M. (1976). Birds of Western Australia. Univ. West. Aust. Press. Perth, Western Australia. 481 pp.

Spencer, W. B. (1896). Summary of the zoological, botanical and geological results of the expedition. In: Rept. Horn Expedition to Central Australia. 139-199.

Storr, G. M. (1964). Some aspects of the geography of Australian reptiles. Senck. biol. 45: 577-589.

Tyler, M. J., Smith, L. A. and Johnstone, R. E. (1984). Frogs of Western Australia. West. Aust. Mus., Perth. 109 pp.

Worsley Alumina Pty. Ltd. (1985). Worsley Alumina Project. Flora and Fauna Studies, Phase Two. Worsley Alumina Pty. Ltd., Perth, Western Australia.

Youngson, W. K. and Henry, J. (1983). A comparison of the fauna of Reserves C12049, C12632 and adjacent farmland in the Harvey area, Western Australia. Internal report to the Department of Conservation and Environment.

Youngson, W. K. and Henry, J. (1984). The vertebrate fauna of a proposed primary aluminium plant site near Worsley Siding, Western Australia. Internal Report to the International Aluminium Consortium of W.A.

7.0 PERSONNEL

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8.0 **A P P E N D I C E S**

APPENDIX 1 A comparison of the fauna of the Kemerton area (Kem) with two locations on the southern Coastal Plain and four locations on the western Darling Range.

Area 1 = Reserves C12049, C12632, Harvey (Youngson & Henry 1983)
Area 2 = Benger Swamp (Sedgwick 1973, 1977)

Area 3 = Serpentine/Jarrahdale (Nichols et al., 1981)
Area 4 = Samson/Willowdale (Nichols et al., 1981)
Area 5 = Worsley Refinery, Collie (Worsley Alumina, 1985)
Area 6 = Alternative smelter site, Collie (Youngson & Henry, 1984)

* = Recorded during this survey

	Southern Coastal Plain			Western Darling Range			
	Kem	1	2	3	4	5	6
BIRDS							
Emu	X*	X		X	X	X	X
Black-throated Grebe	X*	X	X			X	
Hoary-headed Grebe	X*		X			X	
Great Crested Grebe			X				
Australian Pelican	*		X				
Little Black Cormorant	X*	X	X				
Great Cormorant	X		X				
Pied Cormorant	X*						
Little Pied Cormorant	X*	X	X			X	
Darter	X*		X				
Pacific Heron	X*	X	X				
White-faced Heron	X*	X	X			X	X
Great Egret			X				
Little Egret			X				
Cattle Egret			X				
Rufous Night Heron	X*	X	X				
Little Bittern			X				
Brown Bittern			X				
Sacred Ibis	X*	X	X				
Straw-necked Ibis	X*	X	X				
Glossy Ibis			X				

APPENDIX 1 - Cont.

	Southern Coastal Plain			Western Darling Range			
	Kem	1	2	3	4	5	6
BIRDS							
Royal Spoonbill			X				
Yellow-billed Spoonbill	X		X				
Black Swan	X*	X	X			X	
Freckled Duck			X				
Mountain Duck	X*	X	X			X	
Black Duck	X*	X	X			X	X
Grey Teal	X*	X	X			X	
Chestnut Teal	X						
Blue-winged Shoveller	*		X				
Pink-eared Duck			X				
Hardhead	X		X				
Wood Duck	X*	X	X			X	X
Blue-billed Duck	X*		X				
Musk Duck	X*	X	X			X	
Black-shouldered Kite		X	X		X		
Square-tailed Kite	*				X	X	
Whistling Kite	X		X	X	X	X	
Brown Goshawk	X*			X		X	
Collared Sparrowhawk	X*	X	X	X			
Little Eagle	*	X		X	X	X	X
Wedge-tailed Eagle	*						
Marsh Harrier	X*	X	X				
Australian Hobby	X*		X				
Brown Falcon		X	X				
Australian Kestrel	X*	X	X	X	X		X
Stubble Quail				X			
Painted Button-quail				X			
Banded Land Rail	X	X	X				
Spotted Crake			X				
Spotless Crake	X		X				X
Swamphen	X*	X	X			X	
Black-tailed Native Hen	X*		X				
Dusky Moorhen	X		X				
Coot	X*		X				
Banded Plover		X	X				
Eastern Golden Plover			X				
Red-capped Plover			X				
Black-fronted Plover	*		X			X	

APPENDIX 1 - Cont.

	Southern Coastal Plain			Western Darling Range			
	Kem	1	2	3	4	5	6
BIRDS							
Bar-tailed Godwit			X				
Marsh Sandpiper			X				
Greenshank			X				
Wood Sandpiper			X				
Common Sandpiper			X				
Red-necked Stint			X				
Sharp-tailed Sandpiper			X				
Curlew Sandpiper	*		X				
Red-necked Avocet			X				
Pied Stilt	*		X				
Oriental Pratincole			X				
Silver Gull			X				
Whiskered Tern			X				
Common Bronzewing	X*	X		X	X	X	X
Brush Bronzewing				X			
Purple-crowned Lorikeet	*		X	X	X	X	
Ring-necked Parrot	X*	X	X	X	X	X	X
Red-capped Parrot	X*	X	X	X	X	X	X
Western Rosella	X		X	X	X	X	X
Elegant Parrot	X*	X	X	X	X		X
Baudin's Cockatoo	X*	X		X	X		
Carnaby's Cockatoo						X	X
Red-tailed Black Cockatoo				X	X	X	X
Pallid Cuckoo	X	X	X		X		X
Fan-tailed Cuckoo	*	X		X	X	X	X
Horsfield's Bronze Cuckoo	*	X	X	X	X		
Shining Bronze Cuckoo	X*	X	X	X	X	X	X
Barn Owl					X		
Boobook Owl	X*			X	X	X	
Tawny Frogmouth				X	X	X	X
Australian Owlet Nightjar	X	X			X	X	
Laughing Kookaburra	X*	X	X	X	X	X	X
Sacred Kingfisher	X*	X	X	X	X	X	
Rainbow Bee-eater	X*	X	X	X	X	X	
Welcome Swallow	X*	X	X	X	X	X	
Tree Martin	X*	X	X	X	X	X	X
Richard's Pipit	X*	X	X	X	X	X	
Black-faced Cuckoo-shrike	X*	X	X	X	X	X	X

APPENDIX 1 - Cont.

	Southern Coastal Plain			Western Darling Range			
	Kem	1	2	3	4	5	6
BIRDS							
White-winged Triller	*	X	X				
Red-capped Robin	*						
Scarlet Robin	X*	X	X	X	X	X	X
Hooded Robin		X					
Yellow Robin	*			X	X	X	X
White-breasted Robin				X	X	X	X
Golden Whistler	X*	X		X	X	X	X
Rufous Whistler	X*	X	X	X			X
Grey Shrike-thrush	X*	X		X	X	X	X
Grey Fantail	X*	X	X	X	X	X	X
Willie Wagtail	X*	X	X	X	X		
Western Flyeater	X*	X	X	X	X	X	X
Weebill		X		X	X	X	
Broad-tailed Thornbill	X*	X	X	X	X	X	X
Western Thornbill	*	X		X	X	X	X
Yellow-rumped Thornbill	X*	X	X	X	X	X	X
White-browed Scrub-wren	X*	X	X	X	X	X	X
Splendid Fairy-wren	X*	X	X	X	X	X	X
Red-winged Fairy-wren				X	X	X	X
Clamerous Reed Warbler	X*	X	X				
Little Grassbird	X*		X				
Australian Sittella	*	X		X	X	X	X
Rufous Tree-creeper				X	X	X	X
Spotted Pardalote	*			X	X	X	X
Striated Pardalote	X*	X	X	X	X	X	X
Grey-breasted White-eye	X*	X	X	X	X	X	X
Brown Honeyeater	X*	X	X	X	X		X
Singing Honeyeater	X			X			
White-naped Honeyeater				X	X	X	X
New Holland Honeyeater		X	X	X	X	X	X
White-cheeked Honeyeater				X		X	
Tawny-crowned Honeyeater		X			X		
Western Spinebill	X*	X		X	X	X	X
Little Wattlebird				X	X	X	
Red Wattlebird	X*	X	X	X	X	X	X
White-fronted Chat		X	X	X		X	
Red-eared Firetail				X	X	X	X
Magpie-lark	X*	X	X		X		X

APPENDIX 1 - Cont.

	Southern Coastal Plain			Western Darling Range			
	Kem	1	2	3	4	5	6
BIRDS							
Black-faced Woodswallow	X	X	X		X		
Dusky Woodswallow	*	X		X	X	X	X
Grey Butcherbird	X*	X	X	X	X		X
Australian Magpie	X*	X	X	X	X		X
Grey Currawong	X*	X		X	X	X	X
Little Crow			X				
Australian Raven	X*	X	X	X	X	X	X
Total number of species	95	73	102	65	64	66	52
MAMMALS							
Tachyglossus aculeatus				X		X	X
Antechinus flavipes				X	X		X
Dasyurus geoffroii				X	X	X	
Phascogale tapoatafa						X	
Sminthopsis griseoventer						X	
Myrmecobius fasciatus				X			
Isooden obesulus				X		X	X
Trichosurus vulpecula	*			X	X		
Cercartetus concinnus	*			X	X	X	
Tarsipes rostratus	X						
Macropus fuliginosus	X*	X		X	X	X	X
M. irma	X*	X		X	X	X	
Setonix brachyurus				X			
Hydromys chrysogaster						X	
Total number of species	5	2	0	10	6	9	4

APPENDIX 1 - Cont.

	Southern Coastal Plain			Western Darling Range			
	Kem	1	2	3	4	5	6
AMPHIBIANS							
Crinia georgiana	X			X	X	X	X
Geocrinia leai	X			X	X	X	X
Heleioporus barycragus					X		
H. eyrei	X*	X		X	X	X	
H. inornatus				X		X	
Limnodynastes dorsalis	X*	X		X	X	X	X
Pseudophryne guentheri	*	X		X			
Ranidella insignifera	X*	X					
R. glauerti	X*	X		X		X	X
R. pseudinsignifera				X			X
Litoria adelaidensis	X*	X		X	X		X
L. moorei	X*	X					
Total number of species	9	7	0	9	6	6	6
REPTILES							
Chelodina oblonga	*	X					
Diplodactylus polyophthalmus				X	X	X	
Phyllodactylys marmoratus	*				X	X	X
Phyllurus milii				X	X		
Aprasia pulchella				X			
Lialis burtonis	*	X		X			
Pygopus lepidopodus		X					
Pogona m. minor	*	X		X			
Cryptoblepharus plagiocephalus	X*	X		X	X		
Ctenotus delli				X		X	
C. impar	*						
C. labillardieri	X	X		X	X	X	X
Egernia luctuosa	X				X		
E. napoleonis	*	X		X	X	X	X
E. p. pulchra					X	X	
Hemiergis i. initialis				X	X	X	

APPENDIX 1 - Cont.

	Southern Coastal Plain			Western Darling Range			
	Kem	1	2	3	4	5	6
REPTILES							
H. p. peronii						X	X
H. p. quadrilineata	X*	X				X	
Leiolopisma trilineatum	X*	X		X		X	
Lerista distinguenda	X*	X		X	X	X	X
L. microtis						X	
Menetia greyii	*			X	X	X	
Morethia lineoocellatus	X*						
M. obscura				X	X	X	X
Sphenomorphus australis							X
Tiliqua r. rugosa	X*	X		X	X	X	X
Varanus gouldii	*			X	X		
V. rosenbergi	*					X	
Ramphotyphlops australis	X*	X		X	X		X
Python spilotus imbricatus				X		X	
Acanthophis antarcticus				X			
Notechis coronatus		X					
N. scutatus occidentalis	*	X		X	X	X	
Pseudonaja a. affinis	*	X		X	X	X	
Rhinoplocephalus gouldii					X		
R. nigriceps						X	
Total number of species	20	15	0	21	18	20	9