Chapter 6

FAUNA

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Abstract

Although not studied in detail, the fauna of the Lesueur Area is known to be rich in species of vertebrates, with 15 indigenous mammal species, 124 bird species, 48 reptile species and 9 frog species. In comparison with other existing conservation reserves in south western Australia, it is richer in species than all except a few, much larger areas.

Among birds, Lesueur is rich in species of the kwongan and species that depend on nest hollows in the wandoo woodlands, e.g. Carnaby's Black Cockatoo and the Regent Parrot. The reptile fauna is particularly rich in geckoes and legless lizards.

Terrestrial and aquatic invertebrates have not been studied in detail. However, the little that is known suggests that it is rich in species, e.g. 104 species of macro-invertebrates were sampled in a brief survey of aquatic sites. Lesueur includes some species of invertebrates not known from elsewhere.

6.1 INTRODUCTION

The fauna of the Lesueur Area has not been studied in detail. The only published biological surveys are of a vertebrate survey of the western parts of the Area by the Western Australian Museum in 1973 and 1974 (Chapman *et al.* 1977) and an ecological study of the heathlands of the Leeman area (actually within the north western part of the Lesueur Area) by the W.A. College of Advanced Education, Claremont Campus, in September of 1981 and 1982 (Foulds and McMillan no date). Neither of these surveys included an examination of the Bitter Pool Rises and Banovich Uplands landscape units to the east of Mount Lesueur. Some additional data are available from unpublished studies by consultants commissioned by the mining Companies exploring the coal deposits in and adjacent to the Lesueur Area and from other studies on specific species.

6.2 VERTEBRATES

6.21 Mammals

Taxonomy follows Strahan (1983) and more recent taxonomic research. Data are from Chapman and Kitchener (1977), the Western Australian Museum mammal register, Foulds and McMillan (n.d.), observations by E.A. Griffin (personal communication), observations and trapping by S. van Leeuwen (personal communication), Lynam (1987) and an unpublished draft report (incomplete, dated April 1989) by Martinick and Associates, being prepared for Canning Resources Pty Ltd (Martinick and Associates 1989b). Bats were sampled only by the Museum survey.

Table 6.1 lists the mammals recorded from the Lesueur Area, and their recorded distribution by landform (see Chapter 3).

The taxonomy of the *Sminthopsis murina* species complex is not clear and the records of both *Sminthopsis griseoventer* and *S. dolichura* at Lesueur require further investigation. However, it is quite possible that both occur there.

Fifteen species of indigenous mammals have been recorded. None of the species recorded has been declared "rare or likely to become extinct" or "in need of special protection" under the Wildlife Conservation Act, and none has restricted distributions.

The Lesueur Area contains almost all the extant indigenous mammals that could be expected in this region and has an important part to play in their conservation. The bat fauna is under-sampled. Based on known distributions, species that may be present in the Lesueur Area include *Tadarida australis*, *Mormopterus planiceps* and *Nyctophilus major.*

Eleven species of native mammals (excluding bats) have been recorded in the Lesueur Area. Comparative figures for other existing and proposed conservation reserves are given in Table 12.2. Lesueur has more species recorded than most reserves in the south west. Only Dryandra and Dragon Rocks, with rich

Table 6.1
Mammals of the proposed Lesueur National Park, showing distribution according to landform.

INDIGENOUS SPECIES

Echidna, *Tachyglossus aculeatus*, common in uplands.

Grey-bellied Dunnart, *Sminthopsis griseoventer*, Peron Slopes, Gairdner Dissected Uplands, Bitter Pool Rises, Banovich Uplands.

White-bellied Dunnart, *Sminthopsis dolichura,* trapped by Lynam (1987) 1 to 2 km north west of Mount Peron in heath on grey-white sand (Peron Slopes).

Fat-tailed Dunnart, *Sminthopsis crassicaudata*, in samphire in Salt Lake Complex, Bassendean Dunes, Banovich Uplands.

White-tailed Dunnart, *Sminthopsis granulipes*, trapped by W.A.Museum in Bassendean and Spearwood Dunes, trapped by Lynam (1987) 1 to 2 km north west of Mount Peron in heath on grey-white sand (Peron Slopes).

Honey Possum, *Tarsipes rostratus*, very common, Spearwood Dunes, Peron Slopes, Lesueur Dissected Uplands, Gairdner Dissected Uplands, Bitter Pool Rises, Banovich Uplands.

Brush Wallaby, *Macropus irma*, uncommon throughout.

Western Grey Kangaroo, *Macropus fuliginosus*, common throughout.

Euro, *Macropus robustus*, uncommon throughout.

Gould's Wattled Bat, *Chalinolobus gouldii,* recorded in Spearwood Dunes, probably widespread.

Chocolate Bat, *Chalinolobus morio*, in uplands, roosts in caves.

King River Eptesicus, *Eptesicus regulus,* recorded in marri woodland along Cockleshell Gully.

Lesser Long-eared Bat, *Nyctophilus geoffroyi,* recorded in Quindalup Dunes, probably more widespread.

Ash-grey Mouse, *Pseudomys albocinereus*, sandy soils, Lesueur Dissected Uplands, Peron Slopes, Gairdner Dissected Uplands, Banovich Uplands, Bitter Pool Rises.

Southern Bush Rat, *Rattus fuscipes*, common throughout.

INTRODUCED SPECIES

European Rabbit, *Oryctolagus cuniculus,* common near edges of proposed reserve, few in bushland areas.

Dog, *Canis familiaris*, dingoes recorded occasionally, wild dogs also observed.

Red Fox, *Vulpes vulpes,* common throughout.

Feral Cat, *Felis catus*, common throughout.

Feral Pig, *Sus scrofa*, scarce.

Horse, *Equus caballus*, formerly common, now scarce.

Cattle, *Bos taurus*, formerly uncommon, now absent.

House Mouse, *Mus musculus,* common throughout.

woodlands, and the large, diverse Fitzgerald River National Park have more species.

Of particular interest is the occurrence of three (possibly four) species of *Sminthopsis* (Dunnarts) at Lesueur. *Sminthopsis granulipes* has a restricted range in the south west of Western Australia, and in the northern kwongan is restricted to an area bounded by Moora, Three Springs, Eneabba, Lesueur and Badgingarra. Honey Possums, which are endemic to the south west of Western Australia, are abundant within the Lesueur Area; more so than in any existing nature conservation reserves, except those on the south coast.

One important feature of the Lesueur Area is the occurrence of recent fossil mammal deposits in nearby caves. Chapman and Kitchener (1977) list 18 of the species recorded in the cave deposits as probably present in the district prior to European settlement and a further six species recorded during their survey that are not represented in the caves, but which were probably present (the cave fauna is thought to have been accumulated by owls). Only six of the 18 were recorded during the 1973-4 survey and one additional species, the dingo, since. Some of the locally extinct species, such as Woylie *Bettongia penicillata*, Chuditch *Dasyurus geoffroii*, Mardo *Antechinus flavipes*, Dibbler *Parantechinus apicalis*, Quenda *Isoodon obesulus*,

Western Mouse *Pseudomys occidentalis* and Heath Rat *P. shortridgei*, still occur in other parts of the south west and could be reintroduced if foxes and cats could be controlled, suitable fire regimes maintained and the area kept free of *Phytophthora*.

Eight introduced mammal species have been recorded. In common with most of Western Australia, house mice, cats and foxes are abundant. Horses were once common, much of the area having been reserved for "Horse Breeding" early in the century to provide mounts for the army. Today, few remain. Fortunately they seem to have had little long-term deleterious effects on the vegetation. The other introduced species are not common.

6.22 Birds

Taxonomy and vernacular names follow Blakers *et al.* (1984). Data are from Dell and Johnstone (1977), Foulds and McMillan (n.d.), observations by E.A. Griffin (personal communication), observations by S. van Leeuwen (personal communication), Department of Conservation and Land Management files, and an unpublished draft report (incomplete, dated April 1989) by Martinick and Associates (1989b) being prepared for Canning Resources Pty Ltd.

Bird species that have been recorded in the Lesueur Area are listed in Table 6.2 Estimates of status follow Dell and Johnstone (1977) and are listed as scarce, uncommon, moderately common or common. Presence in the different landforms (see Chapter 3) is given where known.

Records of the Brush Bronzewing *Phaps elegans* and the Letter-winged Kite *Elanus scriptus* by Foulds and McMillan require confirmation and are not included above. Brush Bronzewings were recorded by Burbidge and Boscacci (1989) at the Southern Beekeepers Reserve.

The Lesueur Area has a very rich bird fauna with 122 indigenous and two introduced species having been recorded. This is partly due to the wide range of habitats present, which vary from saltlakes and freshwater springs through kwongan and mallee to woodlands and hills. However, it is also due to the relatively large area of bushland and its relatively undisturbed condition.

With 124 species, Lesueur compares favourably with other existing and proposed conservation reserves in the south west (Table 12.2). Only the large and diverse Fitzgerald River and Kalbarri National Parks have more species recorded and they include coastline as well as wetlands. Dell and Johnstone (1977) recorded an additional 30 species of coastal birds during their survey of the Lesueur Area.

The Lesueur Area is particularly rich in bird species of the kwongan. These include honeyeaters, thornbills, fairy-wrens, Southern Emu-wren, White-browed Scrub-wren, and Calamanthus. It is probably the only place where four species of Fairy-wrens (*Malurus*) occur together in the same kwongan formations.

Carnaby's Black Cockatoo is the largest cockatoo found in the region. It has declined considerably in both abundance and range since European settlement because of clearing of its habitat (Saunders 1986), and is on the Department of Conservation and Land Management's Reserve List under its Policy on Endangered Fauna. Species on the reserve list are reviewed at least every three years for possible declaration as "Endangered Fauna" under The Wildlife Conservation Act. Carnaby's Cockatoo is still declining in range and abundance, and will doubtless be declared "endangered" if habitat loss continues. The species depends on both the heathlands and the woodlands, the former for food and the latter for nest sites and shelter. It also requires access to free water. Nesting occurs only in nest hollows of particular dimensions and at Lesueur these are generally confined to *Eucalyptus wandoo* woodlands (Saunders 1979, 1980, 1982; Saunders and Ingram 1987). In the Lesueur - Eneabba area, there are only a few pockets of woodland that satisfy the requirements for successful breeding, and the woodland to the east of Lesueur is one of the four most important. Cockatoos can remain in an area for many years after they cease breeding, because they are long-lived; thus the effects of habitat alteration can be delayed.

Carnaby's Black Cockatoo demonstrates both the importance of the Lesueur Area itself and its importance as one part of a regional system of conservation reserves in conserving a declining species (Hopkins and Saunders 1987). It also demonstrates the interdependence of species in ecosystems (see Chapter 7).

Other hollow-nesting species that depend on the wandoo woodlands are the Long-billed Corella (Saunders 1977, 1979), Galah, Regent Parrot (now an uncommon species), Western Rosella, Port Lincoln Ringneck, Barn Owl, Boobook Owl and Australian Owlet-nightjar.

Lesueur species at or near their northern range limit on the mainland include Western Rosella, Restless Flycatcher, Southern Emu-wren, Shy Hylacola, Little Wattlebird, Spotted Pardalote and Dusky Woodswallow. The Western Thornbill, Scarlet Robin and Western Spinebill have been recorded sparingly

Table 6.2
Birds of the proposed Lesueur National Park, their abundance and distribution according to landform.

Emu, *Dromaius novaehollandiae*, scarce throughout.

Pacific Heron, *Ardea pacifica*, scarce, Salt Lake Complex.

White-faced Heron, *Ardea novaehollandiae*, uncommon, Salt Lake Complex and freshwater areas.

Great Egret, *Egretta alba,* scarce, Salt Lake Complex.

Black Swan, *Cygnus atratus,* moderately common, Salt Lake Complex.

Australian Shelduck, *Tadorna tadornoides,* common, Salt Lakes Complex and freshwater areas.

Pacific Black Duck, *Anas superciliosa*, moderately common, saltlakes and freshwater.

Grey Teal, *Anas gibberifrons*, common on saltlakes, uncommon on freshwater.

Maned Duck, *Chenonetta jubata*, scarce, Salt Lake Complex, Eatha Spring.

Osprey, *Pandion haliaetus*, scarce, Salt Lake Complex.

Black-shouldered Kite, *Elanus notatus,* scarce throughout.

Whistling Kite, *Haliastur sphenurus,* uncommon throughout.

Brown Goshawk, *Accipiter fasciatus,* scarce throughout, nesting recorded in marri Eucalyptus calophylla 2 km south east of Mt Peron.

Collared Sparrowhawk, *Accipiter cirrhocephalus*, scarce throughout.

Wedge-tailed Eagle, *Aquila audax,* moderately common, mainly in dissected uplands.

Little Eagle, *Hieraaetus morphnoides*, scarce throughout.

Spotted Harrier, *Circus assimilis,* uncommon, mainly in kwongan.

Marsh Harrier, *Circus aeruginosus,* uncommon, Salt Lake Complex.

Peregrine Falcon, *Falco peregrinus,* scarce, Salt Lake Complex.

Australian Hobby, *Falco longipennis,* scarce, Salt Lake Complex, woodlands.

Brown Falcon, *Falco berigora,* moderately common throughout.

Australian Kestrel, *Falco cenchroides,* moderately common throughout.

Mallee Fowl, *Leipoa ocellata,* kwongan, probably locally extinct.

Stubble Quail, *Coturnix novaezealandiae,* scarce, Salt Lake Complex.

Little Button-quail, *Turnix velox,* moderately common, open areas.

Australian Crake, *Porzana fluminea,* scarce, Salt Lake Complex, Eatha Spring.

Black-tailed Native-hen, *Gallinula ventralis,* scarce, Salt Lake Complex.

Eurasian Coot, *Fulica atra*, scarce, Salt Lake Complex.

Australian Bustard, *Ardeotis australis,* varies from scarce to common from year to year.

Pied Oystercatcher, *Haematopus longirostris,* scarce, Salt Lake Complex.

Banded Lapwing, *Vanellus tricolor,* uncommon, Salt Lake Complex, open areas, also on adjacent farms.

Hooded Plover, *Charadrius rubricollis,* scarce, on saltlakes.

Red-capped Plover, *Charadrius ruficapillus,* common, on saltlakes.

Black-fronted Plover, *Charadrius melanops,* scarce, saltlakes and temporary freshwater lakes.

Black-winged Stilt, *Himantopus himantopus,* uncommon, saltlakes and freshwater lakes.

Banded Stilt, *Cladorhynchus leucocephalus,* uncommon, saltlakes and freshwater lakes.

Greenshank, *Tringa nebularia*, uncommon, on saltlakes.

Sharp-tailed Sandpiper, *Calidris acuminata*, uncommon, freshwater areas.

Red-necked Stint, *Calidris ruficollis*, moderately common on saltlakes and freshwater lakes.

Silver Gull, *Larus novaehollandiae,* uncommon, on saltlakes.

Whiskered Tern, *Chlidonias hybrida,* occasional visitor to Salt Lake Complex.

Feral Pigeon, *Columbia livia*, scarce, in woodlands.

Cont'd...

Common Bronzewing, *Phaps chalcoptera*, scarce, Cockleshell Gully and Salt Lake Complex.

Crested Pigeon, *Ocyphaps lophotes*, scarce throughout.

Red-tailed Black-Cockatoo, *Calyptorhynchus magnificus*, scarce, woodlands.

Carnaby's Cockatoo, *Calyptorhynchus funereus latirostris*, common, breeds in woodlands.

Galah, *Cacatua roseicapilla,* moderately common, breeds in woodlands.

Long-billed Corella, *Cacatua pastinator butleri,* common, breeds in woodlands.

Little Corella, *Cacatua sanguinea,* moderately common, woodlands.

Regent Parrot, *Polytelis anthopeplus,* uncommon throughout, breeds in woodlands.

Western Rosella, *Platycercus icterotis,* scarce, woodlands.

Port Lincoln Ringneck, *Barnardius zonarius,* moderately common throughout, breeds in woodlands.

Pallid Cuckoo, *Cuculus pallidus,* common throughout.

Horsfield's Bronze-Cuckoo, *Chrysococcyx basalis,* uncommon, kwongan and woodlands.

Shining Bronze-Cuckoo, *Chrysococcyx lucidus,* uncommon in the woodlands of the dissected uplands.

Southern Boobook, *Ninox novaeseelandiae,* uncommon, breeds in woodlands, feeds widely.

Barn Owl, *Tyto alba,* scarce, breeds in woodlands, feeds widely.

Tawny Frogmouth, *Podargus strigoides,* common throughout.

Australian Owlet-nightjar, *Aegotheles cristatus*, scarce, breeds in woodlands, feeds widely.

Spotted Nightjar, *Caprimulgus guttatus,* scarce throughout.

Fork-tailed Swift, *Apus pacificus,* occasional visitor.

Laughing Kookaburra, *Dacelo novaeguineae,* uncommon in woodlands.

Sacred Kingfisher, *Halcyon sancta,* uncommon throughout.

Rainbow Bee-eater, *Merops ornatus,* uncommon, kwongan and woodlands.

White-backed Swallow, *Cheramoeca leucosternum,* moderately common, kwongan.

Welcome Swallow, *Hirundo neoxena,* common throughout.

Tree Martin, *Cecropis nigricans,* moderately common, breeds in woodlands.

Richard's Pipit, *Anthus novaeseelandiae,* moderately common, Salt Lake Complex, open areas, also on adjacent farms.

Black-faced Cuckoo-shrike, *Coracina novaehollandiae,* common in kwongan and woodlands.

White-winged Triller, *Lalage sueurii,* common throughout.

Scarlet Robin, *Petroica multicolor,* uncommon, kwongan and woodlands.

Red-capped Robin, *Petroica goodenovii,* moderately common, Salt Lake Complex, kwongan, scrub and woodlands.

Hooded Robin, *Melanodryas cucullata,* uncommon, Salt Lake Complex.

White-breasted Robin, *Eopsaltria georgiana*, moderately common, thickets in kwongan, Salt Lake Complex.

Jacky Winter, *Microeca leucophaea,* common, kwongan.

Golden Whistler, *Pachycephala pectoralis,* uncommon, kwongan and woodlands.

Rufous Whistler, *Pachycephala rufiventris,* common throughout

Grey Shrike-thrush, *Colluricincla harmonica,* uncommon throughout.

Crested Bellbird, *Oreoica gutturalis,* common in kwongan, also in woodlands.

Restless Flycatcher, *Myiagra inquieta,* scarce, location not recorded.

Grey Fantail, *Rhipidura fuliginosa,* common, widespread.

Willie Wagtail, *Rhipidura leucophrys,* common throughout.

White-browed Babbler, *Pomatostomus superciliosus,* scarce throughout.

Cont'd...

Birds of the proposed Lesueur National Park, their abundance and distribution according to landform.

Little Grassbird, *Megalurus gramineus,* uncommon, edge of saltlakes and freshwater areas.

Brown Songlark, *Cinclorhamphus cruralis,* moderately common, open areas.

Splendid Fairy-wren, *Malurus splendens*, common in kwongan.

Variegated Fairy-wren, *Malurus lamberti,* common in dense vegetation along creeks.

Blue-breasted Fairy-wren, *Malurus pulcherrimus*, scarce in kwongan.

White-winged Fairy-wren, *Malurus leucopterus*, common, kwongan and Salt Lake Complex.

Southern Emu-wren, *Stipiturus malachurus,* common in kwongan.

White-browed Scrubwren, *Sericornis frontalis,* common, kwongan and scrub.

Shy Hylacola, *Sericornis cautus,* scarce, recorded just outside proposed national park, in mixed sand heath.

Calamanthus, *Sericornis fuliginosus,* common in kwongan.

Weebill, *Smicromis brevirostris*, common, woodlands.

Western Gerygone, *Gerygone fusca,* uncommon, in woodlands.

Inland Thornbill, *Acanthiza apicalis*, common, woodlands and kwongan.

Western Thornbill, *Acanthiza inornata,* uncommon, kwongan.

Yellow-rumped Thornbill, *Acanthiza chrysorrhoa*, common, Salt Lake Complex, wandoo woodlands.

Varied Sittella, *Daphoenositta chrysoptera*, uncommon.

Red Wattlebird, *Anthochaera carunculata,* uncommon throughout.

Little Wattlebird, *Anthochaera chrysoptera*, common throughout.

Spiny-cheeked Honeyeater, *Acanthagenys rufogularis*, scarce, kwongan.

Yellow-throated Miner, *Manorina flavigula,* scarce, kwongan and woodlands.

Singing Honeyeater, *Lichenostomus virescens,* common throughout.

Brown-headed Honeyeater, *Melithreptus brevirostis,* scarce, woodlands.

Brown Honeyeater, *Lichmera indistincta,* common throughout.

White-cheeked Honeyeater, *Phylidonyris niger,* common throughout.

Tawny-crowned Honeyeater, *Phylidonyris melanops,* common in kwongan.

Western Spinebill, *Acanthorhynchus superciliosus*, moderately common, thickets in kwongan.

Pied Honeyeater, *Certhionyx variegatus*, single record.

White-fronted Chat, *Ephthianura albifrons,* uncommon, Salt Lake Complex.

Mistletoe-bird, *Dicaeum hirundinaceum,* uncommon, mainly in woodlands.

Spotted Pardalote, *Pardalotus punctatus,* scarce.

Striated Pardalote, *Pardalotus striatus,* uncommon, mainly in woodlands.

Silvereye, *Zosterops lateralis,* common throughout.

Australian Magpie-lark, *Grallina cyanoleuca,* scarce, Salt Lake Complex.

Black-faced Woodswallow, *Artamus cinereus,* moderately common throughout.

Dusky Woodswallow, *Artamus cyanopterus,* scarce throughout.

Grey Butcher-bird, *Cracticus torquatus,* common throughout.

Pied Butcher-bird, *Cracticus nigrogularis,* scarce, woodlands.

Australian Magpie, *Gymnorhina tibicen*, uncommon, Salt Lake Complex.

Grey Currawong, *Strepera versicolor,* scarce, woodlands.

Australian Raven, *Corvus coronoides,* moderately common throughout.

Little Crow, *Corvus bennetti,* scarce, passage migrant.

further north, but the Lesueur Area is probably their northern limit under most circumstances. This comparatively large list reflects the biological importance of the Lesueur Area, its value as a refuge and its value in studies of factors that limit distribution. Species at their southern limit include Variegated Fairy-wren and Pied Honeyeater.

White-breasted Robins are typical of thickets along watercourses in karri and jarrah forest. However, there is an isolated population in the northern kwongan centred on the Lesueur Area. Here it inhabits thickets in the kwongan, particularly near the coast.

The saltlakes are important summer refuges for several species of waterbirds, including Australian Shelduck (or Mountain Duck), Grey Teal and Banded Stilt. They are also used by resident and migratory wading birds (including species covered by the Japan - Australia and China - Australia Migratory Birds Agreements) as feeding places. The freshwater springs flowing into the saltlakes are especially important, since they provide drinking and feeding places for species that cannot survive on salt water alone, such as Pacific Black Duck and Australian Crake and other species that utilise the salt lakes for food. They also are important breeding places for species that require dense rushes or reeds, e.g. crakes and Little Grassbird.

6.23 Reptiles

Taxonomy follows that of the Western Australian Museum [see Wilson and Knowles (1988) for a recent treatment of lizards and snakes]. Data are from Dell and Chapman (1977), the Western Australian Museum reptile register, Foulds and McMillan (n.d.) and an unpublished draft report (incomplete, dated April 1989) by Martinick and Associates (1989b) being prepared for Canning Resources Pty Ltd.

Reptiles known from the Lesueur Area are listed in Table 6.3, together with the landforms from which they have been recorded. This table should be interpreted with caution because:

i) Trapping and searching effort has not been the same in all landforms. The Museum and WACAE surveys did not examine the two eastern landforms (Banovich Uplands and Bitter Pool Rises) and the Museum survey predated the use of modern pitfall trapping methods, while the Martinick and Associates (1989b) survey is restricted to three landforms (Gairdner Dissected Uplands, Banovich Uplands and Bitter Pool Rises). In addition, the Museum survey was carried out in late autumn and late spring, while the data available from the Martinick survey are restricted to spring and early summer.

ii) The landforms from Peron Slopes eastwards are very complex, containing numerous soil and vegetation units.

iii) Few data are available on micro-habitat.

Foulds and McMillan (n.d.) recorded *Pseudonaja affinis*, the Dugite, from the Lesueur Area, but did not lodge a specimen in the Museum. This record needs confirmation. The common *Pseudonaja* in this area is the Gwardar, *P. nuchalis*. If dugites do occur in this area they are at the northern limit of their distribution.

Forty-eight reptile species have been recorded in (or immediately adjacent to) the Lesueur Area and the continuing additions to the 1974 Museum list suggest that further species await discovery.

The reptile fauna of the Lesueur Area is a rich one; it has more species than any existing conservation reserve in the south west of the State, except the much larger and more northern Kalbarri National Park (Table 12.2). The Lesueur Area is particularly rich in geckoes (9 species) and legless lizards (6 species). It is the only place where three species of the *Diplodactylus vittatus* group (*granariensis*, *ornatus* and *polyophthalmus*) occur together, and it provides an opportunity for evolutionary and ecological studies in this group.

Some idea of the reptile species richness of this area of the State, and the value of the Lesueur Area in conserving it, can be gauged by listing species recorded in similar habitats nearby, but not in the Lesueur Area (data from W.A. Museum reptile register). These are: *Diplodactylus michaelseni*, *Aprasia repens*, *Ctenotus catenifer*, *C. gemmula*, *C. schomburgkii*, *L. lineopunctulata*, *Aspidites ramsayi*, *Morelia spilota imbricata*, *Notechis scutatus*, *Rhinoplocephalus nigriceps*, *Vermicella bertholdi*, *V. bimaculata*, *V. calonotus* (declared endangered under the Wildlife Conservation Act), and V. *fasciolata*. It can be seen that only 14 additional species have been recorded in nearby, comparable areas of the northern kwongan and that the Lesueur Area is both species-rich and important in the conservation of the reptiles of the district.

The Woma *Aspidites ramsayi* (a python) has declined drastically in the south west (Smith 1981) and the south western population is now near extinction. It has been declared in need of special protection under the Wildlife Conservation Act. The south west sandplain population is thought to be a different taxon from that of the central deserts (L.A. Smith personal communication) and is thought to have become threatened with extinction mainly because of clearing and fragmentation of its habitat. The only recent records in the northern kwongan are from near

Table 6.3
Reptiles of the proposed Lesueur National Park, showing recorded distribution according to landforms.

	QD	SLC	SD	BD	PS	LDU	GDU	BU	BPR
Agamidae Dragon Lizards									
Ctenophorus maculatus maculatus					X	X			
Pogona minor minor	X		X	X	X	X	X	X	X
Tympanocryptis adelaidensis adelaidensis			X	X	X	X	X	X	X
Gekkonidae Geckoes									
Crenadactylus ocellatus ocellatus			X				X	X	X
Diplodactylus alboguttatus					X		X		
Diplodactylus granariensis granariensis						X	X		
Diplodactylus ornatus					X	X			
Diplodactylus polyopthalmus				X	X	X		X	
Diplodactylus spinigerus spinigerus	X	X	X	X	X	X	X	X	X
Gehyra variegata	X	X	X			X			
Phyllodactylus marmoratus marmoratus		X	X			X			
Underwoodisaurus millii		X	X				X	X	
Pygopodidae Legless Lizards									
Aclys concinna concinna	X			X		X	X	X	
Delma fraseri		X			X		X	X	X
Delma grayii							X	X	X
Lialis burtonis					X		X	X	
Pletholax gracilis	X							X	
Pygopus lepidopodus lepidopodus		X	X		X	X	X	X	X
Scincidae Skinks									
Cryptoblepharus plagiocephalus		X				X	X		
Ctenotus fallens			X		X	X	X	X	X
Ctenotus impar						X	X		
Ctenotus lesueurii			X					X	
Ctenotus pantherinus pantherinus					X		X	X	X
Egernia kingii			X						

Cont'd...

	QD	SLC	SD	BD	PS	LDU	GDU	BU	BPR
Egernia multiscutata bos			X		X	X	X		
Egernia napoleonis				X					
Lerista christinae							X?		
Lerista distinguenda							X	X	
Lerista elegans			X		X				
Lerista planiventralis decora			X*						
Lerista praepedita			X*						
Menetia greyii			*X*				*X*	*X*	*X*
Morethia lineoocellata			X			X		X	X
Morethia obscura					X	X	X	X	
Omolepida branchialis		X							
Tiliqua occipitalis			X						
Tiliqua rugosa rugosa	X	X	X		X		X	X	X
Varanidae									
Varanus gouldii								X	X
Varanus tristis tristis		X				X		X	
Boidae Pythons									
Morelia stimsoni stimsoni		X					X		
Elapidae Frontfanged Snakes									
Demansia psammophis reticulata			X*						
Notechis curtus		X		X	X			X	
Pseudonaja nuchalis							X		
Pseudechis australis					X*				
Rhinoplocephalus gouldii							X	X	X
Vermicella littoralis			X						
Vermicella bimaculatus					X*				
Typhlopidae Blind Snakes									
Ramphotyphlops australis	X#		X#			X	X		

*Recorded from just outside proposed Lesueur National Park, likely to occur on similar landforms within it.

#species uncertain

QD - Quindalup Dunes; SLC - Salt Lake Complex; SD - Spearwood Dunes; BD - Bassendean Dunes; PS - Peron Slopes; LDU - Lesueur Dissected Uplands; GDU - Gairdner Dissected; BU - Banovich Uplands; BPR - Bitter Pool Rises Uplands

Badgingarra and Yandanooka in the 1960s and from near Gunyidi in 1989. There is a reasonable possibility that this endangered species occurs in the Lesueur Area, one of the largest areas of its habitat that remains.

Taxa of limited geographic range that occur in the Lesueur Area include *Tympanocryptis adelaidensis adelaidensis*, *Diplodactylus alboguttatus*, *Aclys concinna concinna*, *Delma grayii*, *Ctenotus lesueurii* and *Lerista christinae*. The last of these has a very restricted range in the Badgingarra - Lesueur - Eneabba area, and is known from only one conservation reserve - Badgingarra National Park. It also occurs on Rottnest Island. *Lerista christinae* is currently declared as endangered fauna under the Wildlife Conservation Act. However, its status has now become better understood and it is proposed to transfer it to the Reserve List.

Three species, *Ctenophorus maculatus*, *Lerista planiventralis* and *Vermicella littoralis* occur at or near the southern limit of their geographic range, and two, *Egernia napoleonis* and *Ctenotus impar*, are at or near their northern limit. The main range of *Diplodactylus polyophthalmus* is from the Stirling Range to the Darling Range; the population in the Lesueur Area is a disjunct one.

Many species are widely distributed in the Lesueur Area. However, some are known only from one or a few landforms. These include *Diplodactylus alboguttatus* (Peron Slopes and Gairdner Dissected Uplands), *D. ornatus* (Peron Slopes and Lesueur Dissected Uplands), *Pletholax gracilis* (Quindalup Dunes and Banovich Uplands), *Ctenotus impar* (Lesueur Dissected Uplands and Gairdner Dissected Uplands), *C. lesueurii* (Spearwood Dunes and Banovich Uplands), *Egernia napoleonis* (Peron Slopes), *Lerista christinae* (Gairdner Dissected Uplands), *L. distinguenda* (Gairdner Dissected Uplands and Banovich Uplands), *L. planiventralis* (Spearwood Dunes), *L. praepedita* (Spearwood Dunes), *Tiliqua occipitalis* (Spearwood Dunes), *Varanus gouldii* (Banovich Uplands and Bitter Pool Rises) and *Morelia stimsoni* (Salt Lake Complex and Gairdner Dissected Uplands). Some of these species may be more widespread in the Lesueur Area than current data indicate, but some may be restricted to special habitats. *Egernia napoleonis*, for example, is at the northern edge of its range and would be expected to be limited to particular habitats. *Lerista christinae* is a northern kwongan endemic with a restricted distribution (except for an isolated population on Rottnest Island) and could also be restricted in its habitat use.

6.24 Amphibians

Taxonomy follows Tyler *et al.* (1984). Data are from Dell and Chapman (1977), Foulds and McMillan (n.d.), the Western Australian Museum register and an unpublished draft report (incomplete, dated April 1989) by Martinick and Associates (1989b) being prepared for Canning Resources Pty Ltd.

Frogs known from the Lesueur Area are listed in Table 6.4, together with data on the landforms from which they have been recorded. As mentioned above (Reptiles), data on landform distribution should be interpreted with caution.

The frog fauna known from the Lesueur Area is not rich in species and is typical of that of the northern kwongan. No known Lesueur species are rare or geographically restricted. The Lesueur Area is near the northern limit of the range of *Heleioporus eyrei*, and *Ranidella pseudinsignifera* occurs as an isolated population at the northern end of its range.

6.3 INVERTEBRATES

6.31 Terrestrial invertebrates

The only published study on the invertebrate fauna of the Lesueur Area is that of the W.A. College of Advanced Education in 1980 and 1981 (Foulds and McMillan n.d.). They worked along the Coorow - Green Head Road, within the Quindalup Dunes, Salt Lake Complex, Spearwood Dunes and Peron Slopes landscape units and recorded 463 species of invertebrates during two brief surveys. Twenty-nine species of jewel beetles were found, four in Quindalup Dunes, 10 in the Salt Lake Complex, 17 in Spearwood Dunes and 15 in Peron Slopes.

Foulds and McMillan concluded that "..this study clearly demonstrates that a rich flora provides a rich invertebrate fauna in heathland habitats" and "The importance of the insect fauna in the Leeman area is twofold. They form an important part of the food web, providing food for arthropods such as spiders, centipedes and scorpions as well as predatory insects (eg. Dragonflies and Mantids). Frogs, many lizards and birds are also dependent on insects for food. Secondly they are essential for the pollination of many plants, in particular the Leguminosae, Orchidaceae and Stylidiaceae." (p.33).

Comparative data on the invertebrates of other areas of the Lesueur Area or other areas of the northern kwongan are not available.

Table 6.4
Frogs of the proposed Mount Lesueur National Park, showing recorded distribution according to landforms.

	QD	SLC	SD	BD	PS	LDU	GDU	BU	BPR
Hylidae Tree Frogs									
Litoria moorei		X							
Leptodactylidae Leptodactylid Frogs									
Myobatrachus gouldii								X	
Ranidella pseudinsignifera		X					X	X	X
Heleioporus albopunctatus		X				X	X	X	X
Heleioporus eyrei			X				X	X	X
Heleioporus psammophilus								X	X
Limnodynastes dorsalis		X			X		X	X	X
Neobatrachus pelobatoides		X	X				X	X	
Pseudophryne guentheri		X					X	X	X

QD - Quindalup Dunes; SLC - Salt Lake Complex; SD - Spearwood Dunes; BD - Bassendean Dunes; PS - Peron Slopes; LDU - Lesueur Dissected Uplands; GDU - Gairdner Dissected; BU - Banovich Uplands; BPR - Bitter Pool Rises Uplands

The little that is known of the invertebrates of the northern kwongan suggests that there are many species restricted to it. Examples include:

1. The undescribed thynnid wasp that pollinates the Arrowsmith Spider Orchid *Caladenia crebra*. The Arrowsmith Spider Orchid can only be pollinated by this wasp, an example of the very close relationship between some insects and some plants. The orchid has evolved a pheromone and an appearance that deceive the wasp into believing that it is mating with a female of its species (Stoutamire 1983). The orchid's distribution extends northwards from Cervantes and the Lesueur Area to near Morawa.
2. The terrestrial mollusc *Bothriembryon perobesus* which is restricted to the northern kwongan (W.A. Museum, personal communication).
3. The native bee *Leioproctus tomentosus*, which is restricted to flowers of *Conospermum crassinervium* (occurs in the Lesueur Area, distributed from near Eneabba to near Gingin) (W.A. Museum, personal communication).
4. Other insects of restricted distribution, such as the undescribed lycaenid butterfly *Ogyris* sp., the skipper butterfly *Croitana croites*, and the weevils *Catasarcus nepheloides*, *C. optimus* and *C. pallescens* (W.A. Museum, personal communication).

These examples support the contention that there are many close associations between the large number of endemic plants of the northern kwongan and insects and other invertebrates, and that there are likely to be many invertebrate species unique to the area. The Lesueur Area doubtless provides an important sanctuary for many of these species.

6.32 Aquatic invertebrates

The only data available on aquatic invertebrates are from a brief October 1988 survey carried out by Streamtec Ecological Consultants (1988) for Martinick

and Associates. The survey was restricted to 11 sites in the eastern section of the Lesueur Area in the vicinity of the proposed coal mine and was conducted at a time when almost all streams had ceased flowing with most reduced to a series of pools, or in extreme cases, to one pool. Cockleshell Gully was dry and was not sampled.

Streamtec recorded a total of 104 macro-invertebrate taxa during their study, Species richness at the 11 sites varied from 15 to 38 species. The most diverse group was the Coleoptera, principally the Dytiscidae (water beetles), with 36 species from four families. The Chironomidae (midges) comprised a combination of lotic (stream) and lentic (pool) species. Three species found have not been recorded previously and are probably new to science. Evidence of the presence of Koonacs (*Cherax plebejus*) was obtained. This south west endemic is threatened by both habitat destruction (including salination) and by competition from the introduced yabbie (*C. destructor*).

Streamtec concluded that the aquatic fauna, as sampled, was a contracted lentic community with elements of lotic species. The lotic species present were typical of streams of the northern jarrah forest. They considered many of the lentic species present to be cosmopolitan as they rapidly colonise suitable wetlands and as such have limited use in characterizing the nature of the aquatic ecosystems of the area. Streamtec strongly recommended further sampling during late winter.

This brief study of the streams in part of the Lesueur Area produced a surprisingly high number of macro-invertebrate species - 104. Lakes like Thomsons and Forrestdale, near Perth, have lists of about 70 species, each from regular sampling, and the list for all jarrah forest streams contains about 260 species (S. Halse personal communication). The very large proportion of predators in the Lesueur sample is indicative of systems that are drying up and is a warning that it is not a typical fauna that was sampled. Clearly, a proper assessment of the biological significance of the Lesueur streams requires sampling in all seasons, including summer (after heavy rainfall).