

Mammals, birds, reptiles and amphibians of the Bulloo Shire, Queensland

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Abstract

The mammals, birds, reptiles and amphibia of Bulloo Shire, south-western Queensland, were surveyed from 1975 to 1977 as part of a programme to list the fauna of Queensland.

Three hundred species of vertebrates were located, consisting of 30 mammals (10 of them introduced exotics), 195 birds (two introduced), 60 reptiles and 15 amphibians. With the exception of the mammals, the species recorded were representative of the known arid zone fauna of Queensland, but included significant extensions of range for a number of species. Although useful data are not available on the fauna present prior to European settlement the species composition of these groups has probably not changed greatly since this intrusion, despite evident environmental changes. The mammals were poorly represented in the survey, with at least two species apparently lost and several others that might reasonably be expected to appear not located and possibly missing. All but one of the small native mammal species recorded were uncommon. This may have been a consequence of difficulty in collecting, at least for some species. One mammal collected was a new record for Queensland, an as yet unnamed species of *Ningauli*.

The presence of 10 exotic mammals, most of them common or abundant in the region, is seen as a significant factor in any faunal changes. The presence of extensive areas of uncleared forest is recognised as the significant factor in species retention. The survey is presented as a basis for identifying and evaluating changes in faunal content that may occur in the region.

INTRODUCTION

In 1964 a programme to list the fauna of Queensland by means of district fauna surveys was instituted (Kirkpatrick and Lavery 1979), with shire boundaries used to define districts. The primary objective of this programme was an inventory of Queensland's fauna, which are afforded protection under the Fauna Conservation Act 1974-1985 and consist of the mammals, birds and reptiles (and two butterflies) of the State. Surveys were also used to provide information on distribution (by careful location of surveys) as well as data on (broadly defined) habitat preferences. Surveys also allowed some measure of abundance of the majority of species to be suggested.

In 1974 the Bulloo Shire was included in the programme. This followed preliminary survey work in 1974 when the feasibility of undertaking this work in such a remote area from a base some 1000 km to the east (Warwick) was established. The study began in May 1975 and finished in May 1977. In addition to the vertebrates covered by the Fauna Conservation Act, the survey included the amphibia of the region.

THE BULLOO SHIRE

Bulloo Shire is in the far south-west of Queensland (Figure 1) and is some 73 600 km² in area. It is bordered by South Australia and New South Wales in the west and south respectively; the northern extremity is Lake Pure Holding and from there the boundary extends in an arc from Dynevor Downs in the east and Caiwarro in the south.

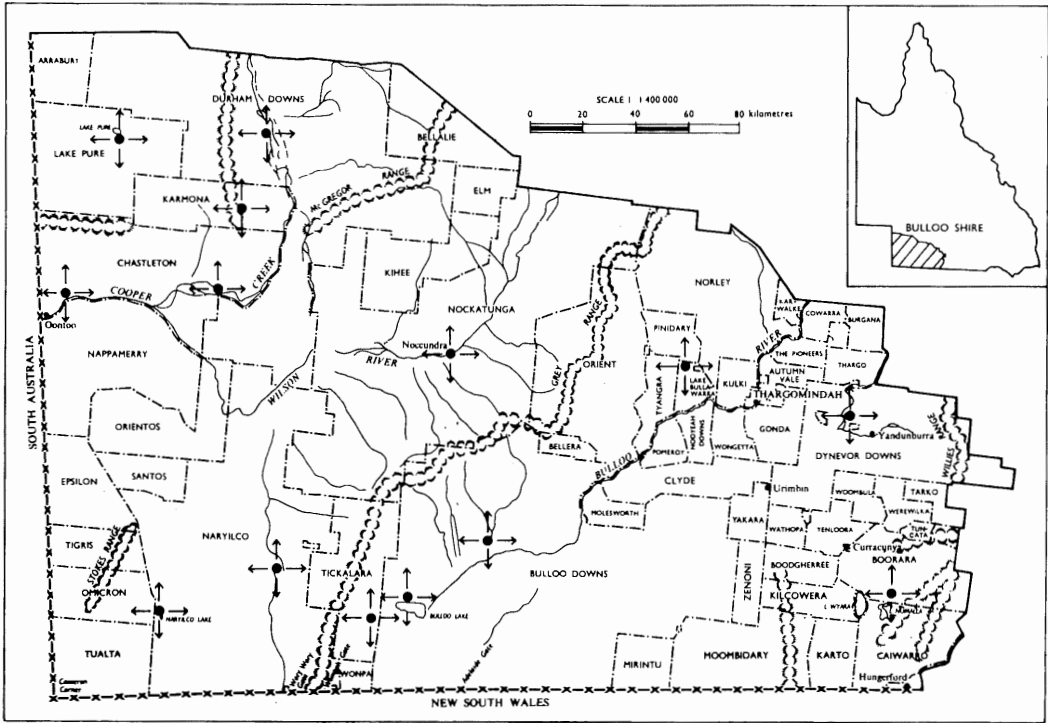


Figure 1. The Bulloo Shire fauna survey area 1975-77. General areas of intensive study are indicated by arrows.

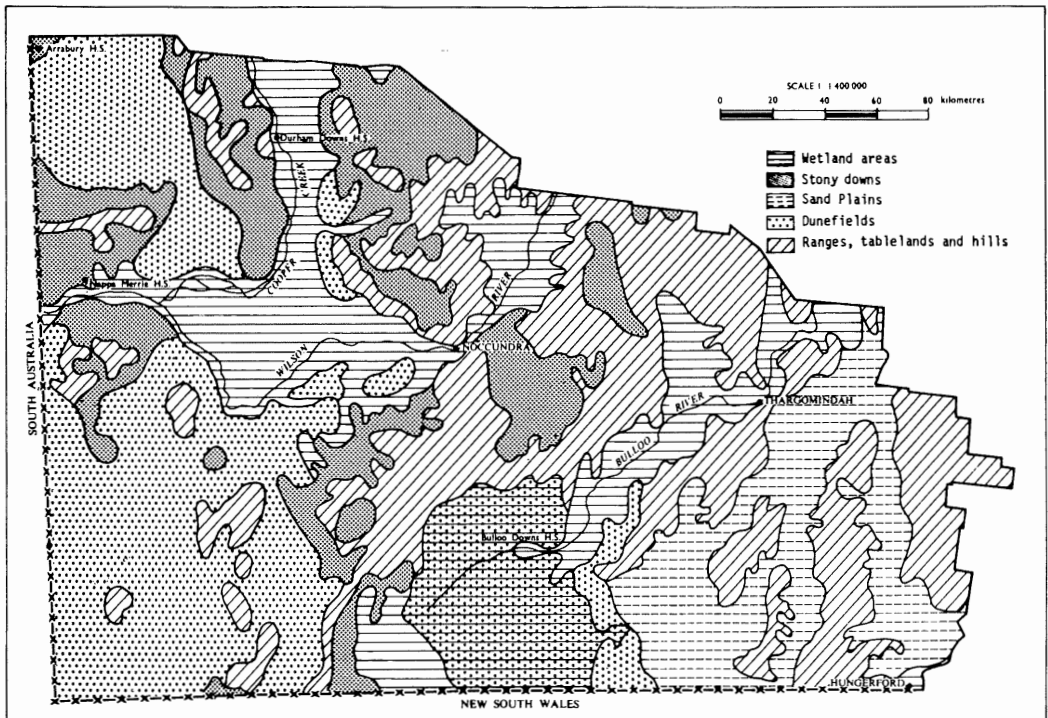


Figure 2. Distribution of the five major land systems (landscapes, habitat types) of the Bulloo Shire, Queensland, (Dawson 1974).

Five major land systems occur within the shire (Dawson 1974) (Figure 2). These are:

- the mulga sand plains of the east;
- the areas of wetlands including the major rivers, lakes and associated tributaries and floodplains;
- the ranges, tablelands and hills;
- the adjacent stony downs; and
- the dunefields of the west and south.

Numerous elevated areas are present throughout the shire and represent the boundaries of the major water catchments and some lakes (Figure 1). Willies Range in the east forms the catchment boundary of the Bulloo and Paroo Rivers, and to its west the Dynevor and Currawinya Lakes complexes form small catchments with limited run-off. Cooper Creek and Bulloo River are the two major watercourses present, both supporting extensive floodplains. Grey Range, through the shire, separates the catchment of Cooper Creek from that of Bulloo River. Within the Cooper Creek catchment, McGregor Range divides the catchment, with the eastern side drained by Wilson River, a tributary of Cooper Creek. Unnamed ranges on the western side of Cooper Creek at Durham Downs and in the vicinity of Nappamerrie form the boundaries of the limited catchment of Lake Pure. Bulloo Lake and Bullawarra Lake are filled when the Bulloo River floods enough in heavy rain to inundate these areas. Other lake systems found within the shire are formed by local run-off, for example Naryilco Lake and Omicron Lake. All large lakes vary in salinity, size and degree of permanence.

The soils (Dawson and Ahern 1974) and vegetation (Boyland 1974) vary markedly from one landform to another, though variations in vegetation are largely dependent on changes in soil type. Typical examples are:

- the mulga associations on the red earths, sandy red earths and siliceous sands of the sand plains in the east;
- forb associations on the grey and brown clays, and alluvial and texture contrast soils of wetland areas;
- the bastard mulga-lancewood-bendee complex on the lithosols and shallow red earths of the ranges, tablelands and hills;
- the Mitchell grass and other short grass-forb associations on the red and brown clays of the stony downs; and
- the acacia-whitewood-herbaceous associations, coupled with spinifex shrub communities, on the earthy and siliceous sands of the dunefields in the south and west.

Some gidgee associations also are found associated with the soils of the stony downs and, to a lesser extent, of the ranges, tablelands and hills.

The climate of the shire is arid (Winkworth and Thomas 1974). There are persistent low annual rainfalls and high rates of evaporation. Two main climatic seasons are recognised—the wet and the dry. The wet season usually extends from early December to late April of each year and is characterised by high daytime temperatures with heavy monsoonal or cyclonic rains often producing major flooding. Cloudy days are more prevalent during the wet. The dry season occupies the remainder of the year and is

characterised by fine sunny days and clear cold nights, at times producing frosts. There are frequent dust storms at this time, the result of high daytime temperatures. Some rainfall, usually of little lasting consequence, can also occur during the dry season.

The only rainfall and temperature data available have been recorded at a number of localities in and just outside the shire, as shown in Figure 3. Rainfall figures are representative of the shire as a whole but available temperatures are representative only of the eastern half. The rainfall recorded during both summer seasons of the survey period was unusually high producing record flooding in many areas. Rainfall in the summer season before the start of the survey also was unusually high.

No national park currently exists within the shire and only one fauna sanctuary is currently declared: the Dynevor Lake complex of 14 740 ha east of Thargomindah.

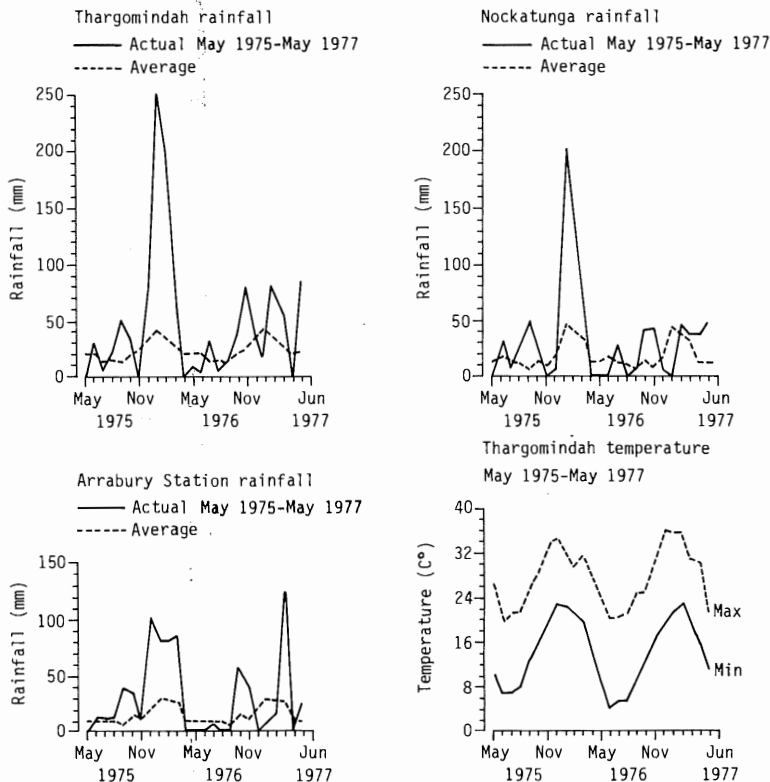


Figure 3. Monthly rainfall recorded at Thargomindah, 'Nockatunga' and 'Arrabury' (see Figure 1 for locations) 1975-77; monthly temperature recorded at Thargomindah 1975-77.

METHODS

Areas representative of the five major land systems, here considered equivalent to habitat types (Figures 1 and 2), were selected for intensive study and provided most of the records obtained. When selecting these sites preference was given to areas displaying several habitat types in close proximity. Sixteen separate, intensive collecting trips, each of three to four weeks were conducted during the two year survey period. Whenever road and weather conditions permitted, these same areas, and some others, were visited for shorter periods at different times of the year to assess seasonal changes in resident and other faunal populations.

The study sites selected, together with a list of the habitat types encountered at each and the number of visits made, are given below.

Study site	No. of visits	Habitat types encountered
Dynevor Downs	3 major visits 7 minor trips	Mulga sand plains; wetlands (lakes); ranges, tablelands and hills.
Boorara Station	3 major visits	Mulga sand plains; wetlands (lakes); ranges, tablelands and hills.
Bulloo Downs	2 major visits 2 minor trips	Wetlands (lakes and channel country); stony downs; dunefields.
Tickalara Station	1 major visit 1 minor trip	Wetlands (channel country, swamps); ranges, tablelands and hills; stony downs.
Naryilco Station	1 major visit 2 minor trips	Wetlands (lakes); ranges, tablelands and hills; stony downs; dunefields.
Durham Downs	1 major visit 3 minor trips	Wetlands (channel country); ranges, tablelands and hills; stony downs.
Nappamerrie Station	2 major visits 2 minor trips	Wetlands (channel country); ranges, tablelands and hills; stony downs; dunefields.
Karmona Station	1 major visit 1 minor trip	Wetlands (channel country); stony downs; dunefields.
Omicron Station	2 minor trips	Wetlands (lakes); ranges, tablelands and hills, dunefields.
Lake Pure	2 minor trips	Wetlands (lakes); dunefields.
Baryulah Outstation	1 minor trip	Wetlands (channel country); stony downs; dunefield.

Surveys made during the dry season comprised usually two persons travelling in separate four-wheel-drive vehicles and using Cunnamulla as a field base for supplies and communication. Light aircraft enabled some isolated areas, particularly in the far west, to be surveyed during the wet season. On long-term collecting visits a base camp was established in a convenient locality. The various habitat types reasonably close at hand were then investigated and surveyed daily.

Faunal records were made by collections of specimens and by observations. Collected specimens were provisionally identified, labelled and preserved. Identifications were confirmed later. The bulk of collected material was then lodged with the Queensland Museum. A few—including only some bats and amphibians—were retained for subsequent reference and study by Queensland National Parks and Wildlife Service staff.

Collecting techniques varied according to the different faunal groups. Drift-fence and pit-fall types of traps of varying lengths were used extensively in sand plain and dunefield habitat types. These proved particularly successful, supplying many of the small mammals, reptiles and amphibians. Both nocturnal and diurnal species were located in this way. A variety of small mammal traps with different bait types were also used. These included break-back rat traps baited with linseed oil and leather (or bacon fat), collapsible aluminium Elliott traps baited with a mixture of rolled oats, peanut paste, dried fruit, honey and bacon fat, and collapsible Mascot wire mammal traps also baited with this mixture. These traps yielded some mammals and reptiles.

Random traverses both by vehicle and on foot in early mornings and late afternoons were used to locate bird species. Many of the large mammal, reptile and some amphibian records were also made on these traverses. Standard 10×50 binoculars were used in most observations to ensure correct identifications.

When observations alone were considered to be inadequate, collections were made by hand or with various calibre shotguns or handguns. Traverses and collections at night, again on foot or by vehicle with the aid of spotlights or headlamps, enabled nocturnal mammals, birds, reptiles and amphibians to be located. The majority of bat records were made in this manner. The collection and detailed examination of owl pellets and stomach contents of foxes and cats proved useful in locating concentrations of some species, particularly small mammals. Reports by local residents were investigated wherever possible.

To simplify descriptions, the five land systems (Figure 2) adopted as habitat types are coded as follows: sand plains (SP); wetland areas (WA); ranges, tablelands and hills (RTH); stony downs (SD) and dunefields (D). In some instances, species were found in all of these habitat types (AH).

For the purpose of this survey, the term 'wetland area' was used for areas displaying some permanency of surface water. These comprise the major rivers and permanent waterholes, the adjacent floodplains subject to periodic inundation, and large lakes. Areas of temporary water, which often occurred in one of the other four habitat types as a result of localised rainfall, were not included as wetland. Reference is made to such areas under 'surface water' or 'temporary water' in other specified habitat types. Any use of artificial water impoundments by a species is also indicated.

Four ratings indicating abundance are given. The broad basis for each (after Kirkpatrick 1966) being numbers observed and collected during each visit to or trapping period in any habitat type as follows:

Abundant—usually large numbers;

Common—usually at least one, often more;

Uncommon—not every visit, but more than twice during the survey; and

Scarce—not more than twice during the survey.

Ratings uncommon and scarce are highly subjective and were used with caution. No estimate of abundance is provided for apparently uncommon species for which a thorough search was not made.

RESULTS

Species collected are listed below together with habitat preferences and estimated abundance in each habitat type. An asterisk (*) indicates that the record is based on a sighting only.

Where a species displayed a preference for a habitat within one or more of the five major land systems, a note indicating this preference is given. Where a species appeared to restrict its range to only a portion of its obviously preferred habitat, a note also is made. Mention is made if a species found in several different habitat types exhibits a difference in abundance between one habitat and another.

Where species exhibit seasonal variations in abundance, ratings used apply to those periods of greatest concentration.

Mammal nomenclature follows Strahan (1983). Bird names are based on RAOU (1978) and those of reptiles and amphibians follow Ingram and Covacevich (1981).

Mammals

Marsupialia

Planigale tenuirostris Troughton. Narrow-nosed planigale. SP, RTH, D, uncommon (three specimens collected).

Ningauai sp. D (spinifex grassland, red sandy soil), one specimen collected.

Sminthopsis crassicaudata (Gould). Fat-tailed dunnart. RTH, SD, uncommon (three specimens collected).

Sminthopsis macroura (Gould). Stripe-faced dunnart. SP, common; D, uncommon; SD, scarce.

**Trichosurus vulpecula* (Kerr). Common brushtail possum. WA (riverine woodland), scarce (one seen).

Macropus giganteus Shaw. Grey kangaroo. SP, abundant; RTH (mainly timbered areas on stony plains), common; D, uncommon. Also in isolated timbered areas.

Macropus robustus Gould. Wallaroo. RTH, common.

Macropus rufus (Desmarest). Red kangaroo. SP, abundant; other habitat types (especially forested areas), uncommon.

Chiroptera

**Pteropus* sp. Flying fox. SP (Eremophila bushes), one specimen observed on several occasions.

Tapozous georgianus Thomas. Common sheath-tail bat. SP, one specimen collected.

Nyctophilus geoffroyi Leach. Lesser long-eared bat. WA, one specimen collected in the vicinity of a lake.

Chalinolobus gouldii (Gray). Gould's wattled bat. WA, SD, two specimens collected in each habitat type.

Nycticeius sp. cf. *greyii* (Gould). Little broad-nosed bat. AH, common.

Tadarida australis (Gray). White-striped mastiff-bat. D, three specimens collected; SD, one specimen collected.

Rodentia

Hydromys chrysogaster Geoffroy. Water rat. WA, common.

Mus musculus (L). House mouse. SP, D, common; also found in urban areas.

Rattus villosissimus (Waite). Long-haired rat. WA (dry floodplains), common.

Leggadina forresti (Thomas). Forrest's mouse. SP, SD (dense grassland areas), uncommon (two specimens collected in each habitat type).

Pseudomys hermannsburgensis (Waite). Sandy inland mouse. SP, D (dense grassland areas), common.

Carnivora

Canis familiaris dingo Meyer. Dingo. D, common; elsewhere, uncommon.

Vulpes vulpes (L). Fox. AH (predominantly in the eastern portion of the shire), common.

Felis catus L. Feral cat. AH, abundant.

Artiodactyla

**Equus caballus* L. Brumby. SD, D (isolated mobs in some instances numbering several hundred present in a few localities), common.

**Equus asinus* L. Feral donkey. RTH, SD (isolated mobs sometimes numbering 30-40 found in a few localities), uncommon.

Sus scrofa L. Feral pig. WA, abundant; SP, common. (Only recently infesting the western portion of the shire).

**Camelus dromedarius* L. Feral camel. D, one mob of approximately 70 animals present in one locality.

**Bos taurus* (L). Feral European cattle. WA, isolated small mobs found in some densely vegetated areas, e.g. lignum swamps.

**Capra hircus* (L). Feral goat. RTH, common.

Birds

Casuariiformes

Dromaius novaehollandiae (Latham). Emu. AH, abundant.

Podicipitiformes

Podiceps cristatus (L.). Great-crested grebe. WA (open water, lakes only), uncommon.

Poliiocephalus poliocephalus Jardine & Selby. Hoary-headed grebe. WA (open water, especially weed-infested portions of lakes), common.

Tachybaptus novaehollandiae (Stephens). Australasian grebe. WA (open water, especially weed-infested portions of lakes), abundant.

Pelecaniformes

**Pelecanus conspicillatus* Temminck. Australian pelican. WA (all open water areas, especially lakes), abundant.

**Anhinga melanogaster* Pennant. Darter. WA (open water in rivers, waterholes and lakes), abundant.

**Phalacrocorax carbo* (L.). Great cormorant. WA (open water, especially lakes; occasionally rivers and waterholes), abundant.

- **Phalacrocorax varius* (Gmelin). Pied cormorant. WA (open water especially lakes), abundant.
 **Phalacrocorax sulcirostris* (Brandt). Little black cormorant. WA (open water, especially lakes; occasionally rivers and waterholes), abundant.
 **Phalacrocorax melanoleucus* (Vieillot). Little pied cormorant. WA, abundant; wet areas in other habitat types, uncommon.

Ciconiiformes

- **Ardea pacifica* Latham. Pacific heron. WA (edges), abundant; temporary waters and earth dams in other habitat types, common.
 **Ardea novaehollandiae* Latham. White-faced heron. WA (edges), common; temporary waters and earth dams in other habitat types, uncommon.
 **Egretta alba* (L.). Great egret. WA (shallow water areas in rivers, waterholes and on lake margins), common.
 **Egretta garzetta* (L.). Little egret. WA (shallow water areas in rivers, waterholes and on lake margins), uncommon.
Egretta intermedia (Wagler). Intermediate egret. WA (shallow water areas in rivers, waterholes and on lake margins), uncommon.
Nycticorax caledonicus (Gmelin). Rufous night heron. WA (forested areas lining rivers and lakes), common.
 **Plegadis falcinellus* (L.). Glossy ibis. WA (shallow water areas in vegetated rivers, waterhole and lake margins), abundant; temporary water areas in other habitat types, uncommon.
 **Threskiornis aethiopica* (Latham). Sacred ibis. WA (shallow water areas in vegetated rivers, waterholes and lake margins), common.
 **Threskiornis spinicollis* (Jameson). Straw-necked ibis. WA (shallow water areas in vegetated backwaters of rivers, waterholes and lakes and adjacent vegetated floodplains), abundant; temporary water areas in other habitat types including bore drains, common.
 **Platalea regia* Gould. Royal spoonbill. WA (shallow water areas in rivers, lakes and on waterhole margins), common; temporary water areas in other habitat types, scarce.
 **Platalea flavipes* Gould. Yellow-billed spoonbill. WA (shallow water areas in rivers, lakes and on waterhole margins), abundant; temporary water areas in other habitat types, common.

Anseriformes

- Dendrocygna eytoni* (Eyton). Plumed whistling duck. WA (banks of rivers and waterholes), abundant.
 **Cygnus atratus* (Latham). Black swan. WA (open water on lakes), abundant.
Stictonetta naevosa (Gould). Freckled duck. WA (open water on lakes), scarce.
Anas superciliosa Gmelin. Pacific black duck. WA, common; temporary water areas in other habitat types including earth dams and bore drains, uncommon.
Anas gibberifrons Muller. Grey teal. WA, abundant; temporary water areas in other habitat types including earth dams and bore drains, common.
 **Anas rhynchotis* Latham. Australasian shoveler. WA (densely vegetated backwaters of lakes), uncommon.
Malacorhynchus membranaceus (Latham). Pink-eared duck. WA (open waters), abundant.
Chenonetta jubata (Latham). Maned duck. WA (including adjacent vegetation, abundant; temporary water areas in other habitat types including earth dams and bore drains, common.
Aythya australis (Eyton). Hardhead. WA, (open waters), abundant; temporary water areas in other habitat types, scarce.
 **Oxyura australis* Gould. Blue-billed duck. WA (open waters, especially lakes), uncommon.
Biziura lobata (Shaw). Musk duck. (especially heavily vegetated sections of lakes and rivers), uncommon.

Falconiformes

- Elanus notatus* Gould. Black-shouldered kite. AH (dryland forested areas), uncommon.
Elanus scriptus Gould. Letter-winged kite. AH (dryland forested areas adjacent to wetlands, particularly lakes), uncommon.
Milvus migrans (Boddaert). Black kite. AH (forested areas, especially rivers, waterholes and man-made structures), abundant.
 **Hamirostra melanosternon* (Gould). Black-breasted buzzard. WA (forested areas lining rivers and waterholes), uncommon.
 **Haliastur sphenurus* (Vieillot). Whistling kite. WA (forested areas), common.
Accipiter fasciatus (Vigors & Horsfield). Brown goshawk. AH (especially in eucalypts lining watercourses), uncommon.
Accipiter cirrhocephalus (Vieillot). Collared sparrowhawk. AH (all densely timbered areas), uncommon.
 **Hieraaetus morphnoides* (Gould). Little eagle. AH (all forested areas), uncommon.

- **Aquila audax* (Latham). Wedge-tailed eagle. AH (forested areas), common.
- **Haliaeetus leucogaster* (Gmelin). White-bellied sea eagle. WA (forested area lining a lake edge), scarce, (one seen).
- Circus assimilis* Jardine & Selby. Spotted harrier. AH (especially arid, timbered areas with associated grasslands), common.
- **Circus aeruginosus* (L.). Marsh harrier. WA (forested areas and associated swampy vegetation especially at lakes), uncommon.
- Falco cenchroides* Vigors & Horsfield. Australian kestrel. AH (especially arid, timbered areas), abundant.
- Falco berigora* Vigors & Horsfield. Brown falcon. AH (especially arid, timbered areas), abundant.
- **Falco hypoleucos* Gould. Grey falcon. D (in a claypan), scarce (one pair seen).
- Falco longipennis* Swainson. Australian hobby. AH (forested areas near water), common.
- **Falco peregrinus* Tunstall. Peregrine falcon. RTH (and feeding in adjacent habitat types), scarce (two sightings only).
- **Falco subniger* Gray. Black falcon. AH (especially trees lining waterholes and rivers, and lightly timbered plains in arid areas), uncommon.

Galliformes

- Coturnix novaezelandiae* Quoy & Gaimard. Stubble quail. AH (especially areas of lightly forested grasslands) uncommon.

Gruiformes

- Turnix velox* (Gould). Little botten-quail. AH (especially areas of lightly forested grasslands), uncommon.
- **Grus rubicundus* (Perry). Brolga. WA (shallow waters and recently dried areas, favouring backwaters of rivers, lakes and claypans), common.
- **Rallus philippensis* L. Buff-banded rail. WA (swampy backwater of a lake), scarce (one record).
- Porzana pusilla* (Pallas). Baillon's crake. WA (densely vegetated edge of rivers), scarce (one record).
- Porzana fluminae* Gould. Australian crake. WA (densely vegetated edges and backwaters of rivers, lakes and waterholes), common.
- Porzana tabuensis* Gmelin. Spotless crake. WA (densely vegetated edge of rivers), scarce (one record).
- Gallinula ventralis* Gould. Black-tailed native hen. WA (margins of rivers, lakes and waterholes), abundant; temporary water areas in other habitat types, common.
- Gallinula tenebrosa* Gould. Dusky moorhen. WA (vegetated rivers and waterholes and occasionally backwaters of lakes), uncommon.
- Porphyrio porphyrio* (L.). Purple swamphen. WA (vegetated edges of rivers, lakes and waterholes), uncommon.
- Fulica atra* L. Eurasian coot. WA (open water, especially lakes), abundant.
- Ardeotis australis* (Gray). Australian bustard. RTH, SD, D (especially lightly forested grassland areas), uncommon.

Charadriiformes

- Vanellus miles* (Boddaert). Masked lapwing. AH (associated with areas of water), common.
- Vanellus tricolor* (Vieillot). Banded lapwing. WA (especially dry floodplains adjacent to water), uncommon.
- Charadrius ruficapillus* Temminck. Red-capped plover. WA (edges of lakes and adjacent mudflats), uncommon.
- Charadrius melanops* Vieillot. Black-fronted plover. AH (edges of all wet areas), abundant.
- Erythrogonys cinctus* Gould. Red-kneed dotterel. WA (vegetated edges of lakes and adjacent mudflats), abundant.
- Peltohyas australis* (Gould). Inland dotterel. SD (especially open bare areas including airstrips and roads), uncommon.
- Tringa nebularia* (Gunnerus). Greenshank. WA (mudflat on a backwater of a lake), scarce (one record).
- Tringa glareola* L. Wood sandpiper. WA (lake edge), scarce (one record).
- Tringa hypoleucos* L. Common sandpiper. WA (mudflats in backwaters of lakes), scarce (two records).
- Calidris acuminata* (Horsfield). Sharp-tailed sandpiper. WA (lake edges), scarce.
- Himantopus himantopus* (L.). Black-winged stilt. WA (shallow water areas, especially inundated claypans and lakes), common.
- Recurvirostra novaehollandiae* Vieillot. Red-necked avocet. WA (shallow water areas, especially mudbanks and backwaters in lakes), uncommon; D (inundated claypans), scarce.
- Stiltia isabella* (Vieillot). Australian pratincole. SRD (especially open bare areas including roads), abundant.
- Larus novaehollandiae* Stephens. Silver gull. WA (open water areas, especially lakes), common.
- Chlidonias hybrida* (Pallas). Whiskered tern. WA (open water areas, especially lakes), common.

Gelochelidon nilotica (Gmelin). Gull-billed tern. WA (open water areas, especially lakes), common.
Hydroprogne caspia (Pallas). Caspian tern. WA (open water areas, especially lakes), common.

Columbiformes

Geopelia placida Gould. Peaceful dove. AH (forested areas, usually near water), common.
Geopelia cuneata (Latham). Diamond dove. AH (forested areas), common.
Phaps chalcoptera (Latham). Common bronzewing. AH (especially densely forested areas on ranges, tablelands and hills), common (encountered more often in the eastern half of the shire).
Ocyphaps lophotes (Temminck). Crested pigeon. AH (forested areas, especially around earth dams, windmills and bores), abundant.
Phaps histrionica (Gould). Flock bronzewing. WA (including on the floodplains of Cooper Creek after floodwaters had receded), abundant; RTH, SD (adjacent to Cooper Creek), scarce.

Psittaciformes

Calyptorhynchus magnificus (Shaw). Red-tailed black cockatoo. RTH (forested area), scarce (one flock seen).
Cacatua leadbeateri (Vigors). Pink cockatoo. AH (forested areas, usually away from water and especially in the east of the shire), SP, D (in dryland situations and central parts of the shire), common.
Cacatua sanguinea Gould. Little corella. AH (areas in the west and central parts of the shire with riverine vegetation as a roosting site and SRD as feeding habitat), abundant.
Cacatua roseicapilla Vieillot. Galah. AH (especially riverine vegetation and adjacent habitat types), abundant.
Nymphicus hollandicus (Kerr). Cockatiel. AH (forested areas), common.
Aprosmictus erythropterus (Gmelin). Red-winged parrot. SP, WA (forested areas in the east of the shire), common.
Barnardius barnardi (Bigors & Horsfield). Mallee ringneck. AH (forested areas, especially eucalypt woodland and riverine vegetation), common.
Psephotus haematogaster (Gould). Blue bonnet. AH (forested areas, especially drylands), uncommon.
Psephotus haematotus (Gould). Red-rumped parrot. AH (trees lining watercourses), uncommon.
Psephotus varius Clark. Mulga parrot. AH (forested areas, especially in the east of the shire), uncommon.
Neophema bourkii (Gould). Bourke's parrot. AH (forested areas, especially acacias in drylands), uncommon.
Neophema chrysostoma (Kuhl). Blue-winged parrot. WA (especially lakeedges and island), uncommon; SD, scarce.
Melopsittacus undulatus Shaw. Budgerigar. AH (forested areas), abundant.

Cuculiformes

Cuculus pallidus (Latham). Pallid cuckoo. AH (forested areas, especially at vegetation close to wetlands), common.
Chrysococcyx osculans (Gould). Black-eared cuckoo. SP (dense stands of mulga), scarce.
Chrysococcyx basalis (Horsfield). Horsfield's bronze-cuckoo. AH (forested areas), common.
Scythrops novaehollandiae Latham. Channel-billed cuckoo. RTH (tree lined channel), scarce (one pair recorded).

Strigiformes

Ninox connivens (Latham). Barking owl. AH (forested areas, especially riverine vegetation), uncommon.
Ninox novaeseelandiae (Gmelin). Southern boobook. AH (forested areas), common.
Tyto alba (Scopoli). Barn owl. AH (forested areas and adjacent grasslands, notably in abandoned dwellings and sheds), common.
Podargus strigoides (Latham). Tawny frogmouth. AH (forested areas), common.
Aegotheles cristatus (White). Australian owllet-nightjar. AH (forested areas, especially at dead trees and trees with hollows such as eucalypts lining watercourses), uncommon.
Caprimulgus guttatus Vigors & Horsfield. Spotted nightjar. AH (forested areas and adjacent grasslands), common.

Apodiformes

Apus sp. D (flying over), scarce.

Coraciiformes

Halycon pyrrhopygia Gould. Red-backed kingfisher. AH (forested areas), common.
Halycon sancta Vigors & Horsfield. Sacred kingfisher. WA (forested edges), common; in eucalypts at other habitat types, scarce.
Merops ornatus Latham. Rainbow bee-eater. AH (forested areas, particularly of riverine vegetation) abundant.

Passeriformes

Mirafra javanica Horsfield. Singing bushlark. AH (dense grassland areas), uncommon.

Cheramoeca leucosternum (Gould). White-backed swallow. WA, D (lightly forested areas usually near water), uncommon.

Hirundo neoxena Gould. Welcome swallow. WA (forested areas), also urban dwellings and structures, common.

Cecropis nigricans (Vieillot). Tree martin. WA (forested), common.

Cecropis ariel (Gould). Fairy martin. WA (forested areas, particularly of eucalypts; urban dwellings and other structures in or adjacent to wetland areas also used as nesting sites), abundant.

Anthus novaehollandiae (Gmelin). Richard's pipit. AH (bare or sparsely vegetated areas), abundant.

Coracina maxima (Ruppel). Ground cuckoo-shrike. AH (lightly forested areas, notably river floodplains), uncommon.

Coracina novaehollandiae (Gmelin). Black-faced cuckoo-shrike. AH (forested areas, especially riverine vegetation), common.

Lalage sueurii (Vieillot). White-winged triller. AH (lightly forested areas), common.

Psophodes cristatus (Gould). Chirruping wedgebill. AH (forested areas usually with a shrub understorey, and dense shrubbery on floodplains), common.

Cinclosoma cinnamomeum Gould. Cinnamon quail-thrust. RTH, SD (lightly forested and sparsely vegetated stony slopes and amongst bushes lining minor watercourses), uncommon.

Pomatostomus ruficeps (Hartlaub). Chestnut-crowned babbler. AH (forested areas usually away from water), common.

Pomatostomus temporalis (Vigors & Horsfield). Grey-crowned babbler. SP (forested areas usually away from water), uncommon.

Pomatostomus halli Cowles. Hall's babbler. SP (areas of dense mulga), uncommon.

Gerygone fusca (Gould). Western gerygone. SP (forested areas, notably gidgee), uncommon.

Acrocephalus stentoreus (Ehrenberg). Clamorous reed-warbler. WA (vegetation, notably lignum lining wetland areas such as lakes), common.

Malurus splendens (Quoy & Gaimard). Splendid fairy-wren. SP (densely forested areas usually with a shrubby understorey), common.

Malurus leucopterus Dumont. White-winged fairy wren. AH (scattered low shrubbery on open and lightly wooded plains, particularly adjacent to wetland areas (lakes); also in *Triodia* grasslands), common.

Malurus lamberti Vigors & Horsfield. Variegated fairy-wren. AH (shrubby areas, especially of wetland vegetation), common.

Smicronis brevirostris (Gould). Weebill. SP (forested areas, especially of eucalypts and acacias lining minor watercourses), common.

Aphelocephala leucopsis (Gould). Southern whiteface. AH (lightly forested areas with scattered shrubs, especially on flats adjacent to wetland areas), common.

Acanthiza nana Vigors & Horsfield. Yellow thornbill. SP (forested areas, especially of dense vegetation lining minor watercourses), uncommon.

Acanthiza uropygialis Gould. Chestnut-rumped thornbill. AH (forested areas), common.

Acanthiza pusilla (Shaw). Brown thornbill. SP (densely forested areas), uncommon.

Acanthiza chrysorrhoa (Quoy & Gaimard). Yellow-rumped thornbill. AH (especially lightly timbered areas in the east of the shire), common.

Sericornis brunneus (Gould). Redthroat. WA, D (vegetation on dunefield floodplains of the Bulloo River overflow), scarce (two records in one locality).

Cincloramphus cruralis (Vigors & Horsfield). Brown songlark. AH (lightly forested areas and associated grasslands), common.

Amytornis barbatus Favolora & McEvoy. Grey grasswren. WA (cane grass-lignum vegetation on the edge of the Bulloo River overflow), uncommon.

Megalurus gramineus (Gould). Little grassbird. WA (area of dense vegetation, particularly lignum lining watercourses such as lakes), common.

Microeca leucophaea (Latham). Jacky winter. WA (forested areas), uncommon; areas of dense trees in other habitat types, uncommon.

Petroica goodenovii (Vigors & Horsfield). Red-capped robin. AH (forested areas), common.

Melanodryas cucullata (Latham). Hooded robin. AH (forested areas), uncommon.

Myiagra inquieta (Latham). Restless flycatcher. WA (forested areas), common; forested areas in other habitat types, uncommon.

- Pachycephala rufiventris* (Latham). Rufous whistler. AH (forested areas, particularly of acacias and in the east of the shire), common.
- Colluricincla harmonica* (Latham). Grey shrike-thrush. AH (especially in densely forested areas lining watercourses), common.
- Oreoica gutturalis* (Vigors & Horsfield). Crested bellbird. AH (densely forested areas in all habitat types, especially in hilly country), common.
- Rhipidura fuliginosa* (Sparrrman). Grey fantail. AH (densely forested areas, especially of acacias in the east of the shire), common.
- Rhipidura leucophrys* (Latham). Willie wagtail. AH (forested areas, especially near water), common.
- Ephthianura albifrons* (Jardina & Selby). White-fronted chat. WA (low shrubby vegetation on edges and floodplains of wet areas), uncommon (three specimens collected).
- Ephthianura tricolor* Gould. Crimson chat. AH (lightly forested areas, especially near water and including claypans and floodplains), common.
- Ephthianura aurifrons* Gould. Orange chat. AH (especially shrubby areas on floodplains and claypans adjacent to water, and on shrub-dotted stony downs country), common.
- Ashbyia lovensis* (Ashby). Gibberbird. SD (especially lightly vegetated areas), common; D (bare claypan interdune areas), scarce.
- Daphoenositta chrysoptera* (Latham). Varied sittella. SP (forested areas, particularly acacias, away from water), uncommon.
- Climacteris picumnus* Temminck & Laugier. Brown treecreeper. WA (eucalypt areas), abundant; eucalypts lining temporary water areas in other habitat types, common.
- Climacteris affinis* Blyth. White-browed treecreeper. SP (densely forested mulga areas), uncommon.
- Dicaeum hirundinaceum* (Shaw & Nodder). Mistletoe bird. AH (arid, timbered areas notably those with mistletoe infestations), common.
- Pardalotus rubricatus* Gould. Red-browed pardalote. AH (forested areas away from water), uncommon.
- Pardalotus striatus* (Gmelin). Striated pardalote. AH (particularly eucalypts along watercourses in the east of the shire), uncommon.
- Plectrohyncha lanceolata* Gould. Striped honeyeater. SP (densely forested areas, especially of acacias), uncommon.
- Melithreptus brevirostris* (Vigors & Horsfield). Brown-headed honeyeater. SP (lightly forested area), scarce (one record).
- Phylidonyris albifrons* (Gould). White-fronted honeyeater. SP (arid timbered area with a shrub understorey), scarce (one specimen recorded).
- Lichmera indistincta* Vigors & Horsfield. Brown honeyeater. AH (forested areas), common.
- Certhionyx niger* (Gould). Black honeyeater. AH (forested areas), uncommon.
- Certhionyx variegatus* Lesson. Pied honeyeater. D (forested areas of acacias), scarce (two records).
- Lichenostomus virescens* (Vieillot). Singing honeyeater. AH (forested areas), abundant.
- Lichenostomus keartlandi* (North). Grey-headed honeyeater. SP (lightly forested areas of mulga-eucalypt associations), scarce (two records).
- Lichenostomus penicillatus* Gould. White-plumed honeyeater. WA (forested areas, especially of eucalypts), abundant; eucalypts lining watercourses in other habitat types, common.
- Manorina flavigula* (Gould). Yellow-throated miner. AH (forested areas), abundant.
- Acanthagenys rufogularis* Gould. Spiny-cheeked honeyeater. AH (forested areas), common.
- Entomyzon cyanotis* (Latham). Blue-faced honeyeater. SP (forested areas of eucalypt-acacia associations), scarce (one record).
- Philemon corniculatus* (Latham). Noisy friarbird. SP (forested areas, especially of eucalypt-acacia associations lining minor watercourses), common.
- Philemon citreogularis* (Gould). Little friarbird. SP (forested areas, especially of mulga-acacia associations lining minor watercourses), common.
- Peophila guttata* (Vieillot). Zebra finch. AH (lightly forested areas, usually associated with dense shrubs and around artificial watering points), abundant.
- Poephila bichenovii* (Vigors & Horsfield). Double-barred finch. SP (dense trees lining minor watercourses), scarce (two records).
- Aidemosyne modesta* (Gould). Plum-headed finch. SP (densely forested area lining minor watercourse), scarce (one record).
- Passer domesticus* L. House sparrow. Only found near urban dwellings and associated buildings, common.
- Sturnis vulgaris* L. Common starling. SP, WA (on wetland margins particularly of lakes), scarce.

Oriolus sagittatus (Latham). Olive-backed oriole. SP, WA (dense acacia lining temporarily flooded area and above eucalypt timber lining a major river), scarce (two records).

Grallina cyanoleuca (Latham). Australian magpie-lark. WA (forested areas, water edges and mud flats), abundant; wet areas adjacent habitat types in other areas, common.

Corcorax melanorhamphus (Vieillot). White-winged cough. SP (especially in densely forested areas lining minor watercourses), common.

Struthidea cinerea Gould. Apostlebird. AH (forested areas, particularly in the east of the shire), abundant.

Artamus leucorhynchus (L.). White-breasted wood-swallow. WA (forested areas), common; trees lining watercourses in other habitat types, uncommon.

Artamus personatus (Gould). Masked wood-swallow. AH (lightly forested areas), abundant.

Artamus superciliosus (Gould). White-browed wood-swallow. AH (lightly forested areas), abundant.

Artamus cinereus Vieillot. Black-faced wood-swallow. AH (forested areas usually away from water), abundant.

Artamus minor Vieillot. Little wood-swallow. SP (lightly forested areas), scarce (two records).

Cracticus torquatus (Latham). Grey butcherbird. AH (forested areas), common.

Cracticus nigrogularis (Gould). Pied butcherbird. AH (forested areas, particularly in the east of the shire), common.

Gymnorhina tibicen (Latham). Australian magpie. AH (forested), abundant.

Chlamydera maculata (Gould). Spotted bowerbird. AH (forested areas, particularly close to water and homesteads), common.

Corvus bennetti North. Little crow. AH (forested areas), abundant.

Corvus coronoides Vigors & Horsfield. Australian raven. AH (forested areas), abundant.

Reptiles

Testudines

Emydura sp. cf. *krefftii* (Gray). Krefft's river turtle. WA (Cooper Creek), abundant.

Emydura sp. cf. *macquarii* (Gray). Murray turtle. WA (Currawinya Lake complex), two specimens collected.

Squamata

Amphibolurus vitticeps Ahl. Central bearded dragon. AH (terrestrial and arboreal, particularly on sandy soils; also on roadways, in earth banks beside roads, in live and dead trees), abundant.

Amphibolurus pictus Peters. Painted dragon. SP, WA, D (under fallen trees and in vegetation lining wet areas), uncommon.

Amphibolurus nuchalis (De Vis). Central netted dragon. AH (especially dunefields and mulga sand plains, including on roadsides), common.

Amphibolurus fordi Storr. Mallee dragon. D (flat claypan interdune areas in far south-west of the shire), common.

Lophognathus gilberti Gray. Gilbert's dragon. AH (especially adjacent to watercourses, and under bark, in burrows, on open ground or in trees), common.

Lophognathus sp. WA (in trees lining a lake edge), one record.

Tympanocryptis tetraporophora Lucas & Frost. Four-pored earless dragon. RTH, SD, D (in earth burrows, bushes, grass clumps and on bare earth), uncommon.

Tympanocryptis lineata Peters. Lined earless dragon. D (vegetated claypan), one collected.

Diplodactylus tessellatus (Gunther). Tessellated gecko. SP, RTH, SD (under logs and sheets of galvanized iron), uncommon.

Diplodactylus ciliaris Boulenger. Spiny-tailed gecko. SP, D (under bark of dead mulga trees and in Triodia and other grassland), common.

Diplodactylus steindachneri Boulenger. SP (grasslands), two records.

Diplodactylus stenodactylus Boulenger. SD, D (especially Triodia grasslands associated with dunefields, in the far south-west of the shire), uncommon.

Lucasium damaeum (Lucas & Frost). Bearded gecko. D (on sand dunes in the far south-west of the shire), two records.

Gehyra variegata (Dumeril & Bibron). Tree dtella. AH (mostly under the bark of dead mulga trees), abundant.

Gehyra australis Gray. Northern dtella. SD, WA (under sheets of galvanized iron and on fence posts in or near towns), uncommon.

Heteronata binoei (Gray). Bynoe's gecko. AH (under logs, sheets of galvanized iron, and amongst ground litter), abundant.

- Nephrurus levis* De Vis. Smooth knob-tailed gecko. D (on sand dunes, roads cutting dunes and in burrows in sand dunes), common; SP (in grasslands), scarce.
- Oedura marmorata* Gray. Marbled velvet gecko. SP (in gidgee lining minor watercourses), common; SD (in firewood heap, also adjacent to a watercourse), scarce.
- Rhynchoedura ornata* Gunther. Beaked gecko. SP, D (grassed sandy areas), common.
- Underwoodisaurus milii* (Bory). Thick-tailed gecko. RTH, SD (under sheets of galvanized iron and amongst rocks), two records.
- Delma tinctoria* De Vis. SP (densely grassed area), two records.
- Delma nasuta* Kluge. D (in Triodia grassland on dune in far south-west of the shire), three records.
- Delma* sp. D (in Triodia grassland on dune in the far south-west of the shire), three records.
- Lialis burtonis* Gray. Burton's flap-footed lizard. D, common; SP, uncommon.
- Pygopus nigriceps* (Fischer). Black-headed scaly-foot. D, common; SP, scarce.
- Cryptoblepharus plagiocephalus* (Cocteau). Snake-eyed skink. AH (in hallows, cracks and under bark, occasionally on the ground), abundant.
- Ctenotus brooksi* (Loveridge). SP, D, three collected.
- Ctenotus pantherinus* (Peters). SP (densely grassed areas usually on soft friable soils), abundant; D, common.
- Ctenotus leonhardii* (Sternfeld). Leonhard's skink. SP, D (on grassed areas), common.
- Ctenotus schomburgkii* (Peters). SP, D (grassed sandy areas), common.
- Ctenotus regius* Storr. SP, D (grassed sandy areas), common.
- Ctenotus* sp. cf. *saxatilis* Storr. D (grassed sandy areas), common; SD (under sheets of galvanized iron on a small floodplain).
- Egernia stokesii* (Gray). Gidgee skink. D (in cracks in dead gidgee standing and fallen), uncommon; SP, scarce.
- Egernia inornata* Rosen. Desert skink. D, one record.
- Lerista muelleri* (Fischer). Timid skink. SP, RTH, D (under logs and in burrows in grassed sandy areas), uncommon.
- Menetia greyi* Gray. AH (amongst ground litter), abundant.
- Morethia boulengeri* (Ogilby). AH (under ground litter, bark and on dead timber both standing and fallen), common.
- Eremiascincus richardsoni* (Gray). Broad-banded sand swimmer. SP, D (grassed sandy and loamy soils particularly in the east of the shire), common; RTH (in a burrow on a floodplain associated with a minor watercourse), one record.
- Eremiascincus fasciolatus* (Gunther). Narrow-banded sand swimmer. D (under sheets of galvanized iron and on sand dunes amongst Triodia grasslands in the west of the shire), two records.
- Tiliqua scincoides* (Shaw). Eastern blue-tongued lizard. SP (around urban dwellings and along roadways), uncommon.
- Trachydosaurus rugosa* Gray. Shingle-back. AH, common.
- Varanus tristis* (Schlegel). Freckled tree monitor. RTH (in a rocky overhang), one record.
- Varanus gouldii* (Gray). Gould's sand goanna. SP, D (especially along roadways), abundant; other habitat types, scarce.
- Liasis childreni* Gray. Children's python. RTH, SD (urban dwellings, stony outcrops), two records.
- Morelia spilota* (Lacepede). Carpet snake. WA (amongst marginal vegetation, particularly in areas of rabbit warrens), uncommon; D (adjacent to watercourses) scarce.
- Demansia torquata* (Gunther). Collared whip snake. SD, one record.
- Denisonia devisii* Waite & Longman. De Vis' banded snake. RTH, one record.
- Pseudechis australis* (Grah). Mulga snake. AH (in burrows, urban dwellings, fallen timber, some wells), common.
- Pseudonaja guttata* (Parker). Speckled brown snake. RTH, SD (near water), two records; SP (near water), one record.
- Pseudonaja modesta* (Gunther). Ringed brown snake. SP, WA, D (usually adjacent to some form of cover), common.
- Pseudonaja nuchalis* Gunther. Western brown snake. AH (roadways, urban dwellings and some wells), common.
- Pseudonaja textilis* (Dumeril, Bibron & Dumeril). Eastern brown snake. SP, SD (urban dwellings, roadways and fallen timber), uncommon.
- Suta suta* (Peters). Curl snake. AH (especially in areas near water), common.
- Simoselaps fasciolatus* (Gunther). Narrow-banded snake. (Triodia grassland in far south-west of the shire), one record.

Vermicella annulata (Gray). Bandy-bandy. SD, one record.

Rhamphotyphlops australis (Gray). D (Triodia grassland in far south-west of the shire), one record.

Rhamphotyphlops bituberculatus (Peters). SP, D (grassed sandy areas), common; SD (near an urban area), one record.

Amphibians

Anura

Limnodynastes fletcheri Boulenger. Long-thumbed frog. WA (edges of waterholes, major river and lakes, particularly in the east of the shire), common.

Limnodynastes tasmaniensis Gunther. Spotted grass frog. AH (edges of wet areas), common.

Platypectrum spenceri (Parker). SP, WA, D (wet areas), common.

Neobatrachus sudelli (Lamb). Meeowing frog. WA, SP, D (along edges and also in sandy soil areas following rain), common.

Notaden bennetti Gunther. Crucifix toad. SP (wet areas, particularly lakes and sandy soil areas following rain), common.

Ranidella deserticola Liem & Ingram. WA (in cracks in the soil in backwaters of wetlands while flooded or in the process of drying out), common.

Uperoleia rugosa (Andersson). Red-groined toadlet. AH (wet areas, and areas away from water following rain), common.

Cyclorana cultripres Parker. SP, RTH, SD, D (temporary pools, claypans and creeks following rain), common.

Cyclorana alboguttatus Gunther. Striped burrowing frog. SP, WA (wet areas, particularly lakes and areas away from water following rain in the east of the shire), common.

Cyclorana novaehollandiae Steindachner. AH (edges of wet areas particularly in the east of the shire following rain), common.

Litoria caerulea (Shaw). Common green tree frog. WA (vegetation particularly eucalypts on the edges of permanent water areas), abundant; SP, D (wet areas, and inhabiting urban dwellings), scarce.

Litoria latopalmata Gunther. SP, WA, SD (wet areas), common.

Litoria peronii (Tschudi). Peron's tree frog. SP, WA (wet areas in the east of the shire), common.

Litoria rubella (Gray). Brown tree frog. AH (wet areas, and in urban dwellings), abundant.

DISCUSSION

There can be no doubt that the vegetation and landform, and so the fauna, of Bulloo Shire have been significantly affected by the impact of European settlement, which began in the 1860s. The extent of the loss of trees cut down to provide fence posts, houses, well and mine-linings, firewood, for drought-feeding of stock and to 'improve' pasture growth is incalculable but manifestly huge, with limited replacement by natural regrowth. The introduction of domestic stock and other exotic species recorded in this survey must surely have had significant, if subtle effects on the composition of the native pastures by trampling and selective grazing. The loss of topsoil both by wind and water following loss of tree cover and ground cover (by overgrazing), is evident throughout the shire. Further, the carnivorous exotics—the cat and the fox—prey on native species that might otherwise be the food of small native carnivores. As well, feral pigs cause extensive soil disturbance in their preferred habitat and consistently invaded pelican rookeries destroying eggs and young.

Thus, while the 300 vertebrate species recorded must surely represent a significant proportion of those present before the intrusion of European settlement, there is no available yardstick against which losses—or additions, other than introduced exotics—attributable to this intrusion may be measured. The only other surveys available are recent—for example Corben (1972), Ford and Parker (1974), Hall (1974), Roberts (1975), Wyndham (1978)—and all the species recorded by these authors from the Bulloo Shire were encountered during this survey.

There are some species known from similar arid areas in inland Australia which, from available general texts (Macdonald (1973), Cogger (1975), Troughton (1954), Ride (1970)) might be expected to occur in the Bulloo Shire. Whether these have disappeared, or whether they were included by the authors without adequate information cannot now be established. Thus while this survey is seen as a baseline for future comparisons, any changes that it records in the pre-European status of its fauna are largely speculative. Some comments on a number of 'expected' species, however, that were not found but may occur in the survey area, need to be made:

Tachyglossus aculeatus (Shaw & Nodder). Echidna. Droppings found in shallow caves within the shire; residents reported an occasional sighting in the eastern portion of the shire.

Antechinomys laniger (Gould). Kultarr. Reported by local residents on two occasions in an area fringing the eastern shire boundary.

Petaurus sp. Glider. Reported on two occasions from areas to the east of the shire.

Phascolarctos cinereus (Goldfuss). Koala. Reported outside the eastern boundary of the shire.

Petrogale xanthopus Gray. Yellow-footed rock wallaby. Reported from a section of the Grey Range to the north-east of the survey area.

Notomys sp. Hopping mouse. Reported occasionally by local residents.

Turnix pyrrhorostrax (Gould). Red-chested button-quail. A single specimen recorded from an area just to the north of the shire.

Burhinus magnirostris (Latham). Bush thick-knee. Recorded from an area to the east of the survey area and reported by local residents as heard occasionally in the eastern portion of the shire.

Cuculus pyrrhophanus (Vieillot). Fan-tailed cuckoo. Recorded from an area to the east of the survey area.

Coracina papuensis (Gmelin). White-bellied cuckoo shrike. Reported by local residents as present in the eastern portion of the shire.

Moloch horridus Gray. Thorny devil. A single report by one local resident.

Tiliqua multifasciata Sternfeld. Centralian blue-tongue lizard. One record from an area to the north of the survey area.

Aspidites ramsayi (Macleay). Woma. Reported by local residents occasionally in a dunefield habitat in the far western portion of the shire.

Acanthopis sp. Death adder. Reported on a number of occasions from the area by local residents.

The failure of the survey to locate *Planigale gilesi* Aitkin, (Aitkin 1972) square-tailed kite (*Lophoictinia isura* (Gould)) and painted snipe (*Rostratula benghalensis* (L.)) is probably due to their comparative scarcity, secretive behaviour, or shortcomings in the search techniques used. All three species are well-known from other, nearby areas, and might reasonably be expected to occur.

The survey also failed to find the greater bilby (*Macrotis lagotis* Reid), several hopping mice (*Notomys alexis* Thomas, *N. fuscus* (Wood-Jones) and *N. cervinus* (Gould)), the kowari (*Dasyuroides byrnei* Spencer), the mulgara (*Dasyercus cristicauda* Krefft), and the desert bettong (*Caloprymnus campestris* (Gould)). This failure is particularly noteworthy, as particular searches were made for these species. While at least one of the species of *Notomys* has been reported, other species have not been, and as these animals have lost ground elsewhere it seems unlikely that any are present in the area.

Another noteworthy apparent loss is a species of stick-nest rat (*Leporillus* sp.). Decaying remnants of a stick-nest similar to those erected by members of the genus were located in a cave in the Grey Range, with no evidence of recent use.

As a general statement, then, the bird, reptile and amphibian faunas of Bulloo Shire revealed by this survey are diverse and representative of Queensland arid zone animals; the mammals are not. Even though 30 mammal species were recorded, 11 are introduced and a significant number of the native species located were apparently uncommon or scarce. The collection of a specimen of an as yet unidentified species of *Ningauia*, however, was a new record, not only for the region but the first record of the genus in Queensland.

For the other groups, however, the survey resulted in a considerable extension of the known range of many species. The collection of a blue-winged parrot (*Neophema chrysostoma*) is the first substantiated record of this species in Queensland. Extensions of range of several hundred kilometres were recorded for the spotless crane, the brown-headed honeyeater, the grey-headed honeyeater, the plum-headed finch, the common starling, the olive-backed oriole and the frog *Limnodynastes spenceri*.

The presence of a number of waders, notably greenshank, wood sandpiper and common sandpiper, was unexpected, and suggests a wider migration path of these species than previously suspected. The occurrence of four species of babblers together in an area just north of Hungerford is noteworthy.

Some animals were recorded only at generic level. Tentative specific identifications, using the description obtained and a knowledge of the species expected from the locality, included the little red flying-fox (*Pteropus scapulatus* Peters) and the fork-tailed swift (*Apus pacificus* (Latham)). The *Ningau* may well be *N. ridei* (Archer), but positive identification is not yet available.

Some species recorded have become pests of man. While these are mostly feral species, the native macropodids, one rodent, some birds (particularly raptors), snakes and numerous amphibians at times pose problems. Of the macropodids, the grey kangaroo and the red kangaroo cause most concern. The eastern portion of the shire, with its better kangaroo habitat, is where problems arise more in time of drought. What little commercial harvesting of kangaroo populations does occur within the shire is largely centred in the east. The long-haired rat, while not observed in plague numbers during the survey, is certainly capable of substantial destruction in townships and at homesteads. Raptors prey on domestic poultry and pigeon species; the falcons, brown goshawk and collared sparrowhawk are principally involved. The spotted bowerbird is also a nuisance in the fruit orchards of homesteads. The abundance of venomous species of snakes, as well as the remoteness of many areas in the shire, has long been a major concern of many local residents, although (as elsewhere) few fatalities have been recorded.

Following rain, frogs enter water tanks, septic systems and other areas of water reticulation within dwellings.

The dingo is of most commercial consequence. Sheep grazed extensively in the eastern half of the shire are particularly vulnerable. Within this area, the erection and maintenance of dingo-proof fences, poison-baiting campaigns, shooting and trapping are used to control numbers of these dogs. Dingoes also are prevalent amongst cattle in the western areas of the shire; graziers tolerate its existence there. The presence of dingoes in an area is alleged to keep cattle in mobs thus facilitating easier, faster and complete mustering.

According to local landholders, the feral pig, the fox, and even the feral cat have a considerable effect in sheep areas; again young stock are most susceptible. The dingo is considered to limit both fox and pig populations.

The five land systems present within the shire (Figure 2) vary markedly in their faunas with regard to species and numbers present. The wetlands and closely adjacent lands support most of the faunal species present. Almost all bird species, larger mammals, many amphibians and a few reptiles are to be found there. The availability of permanent and semi-permanent surface water, the abundance of plant growth on the major floodplains and the often dense woodlands lining the watercourses in these wetland areas all contribute to the value of these areas for fauna. Wetlands play a role in both waterbird and amphibian breeding and consequent survival of these populations.

The areas of arid woodland and grassland present in the mulga sand plains in the east and spinifex-covered dunefields in the west of the shire support large numbers of species. These areas offer temporary water, permanent shelter and a food source that varies with the seasons but does not completely disappear even under the worst conditions.

Many reptiles, small mammals, a number of dryland and grassland bird species and some amphibians are to be found in these two habitat types.

The stony downs country supports few species but these increase with favourable seasonal influences. The barren, often waterless range areas are of least fauna interest, and do not by themselves support any of the species present.

The dunefields and the channel country of Cooper Creek in Bulloo Shire are poorly represented habitat types in other parts of Queensland, except in the Diamantina Shire to the north-west. Both habitat types support a meagre fauna.

The two wet seasons experienced during the survey produced two quite different flood situations (see Figure 2). The first in 1975-76 had high local rainfall and consequent high runoff. Following these floods, large breeding groups of various waterbirds were observed on the major watercourses and lakes. This is obviously the reason for the abundance of waterbirds and the low numbers of wading species recorded. In a drier year, the opposite may occur (see for example Roberts 1975). The wet season of 1976-1977 was characterised by low local rainfall but similar high runoff, a result of heavy rain farther to the north from the shire. Examination of the same rivers and lakes at this time revealed few waterbird congregations, no large-scale breeding, and no obvious isolation or disturbance of other native fauna.

In September 1976 on Bulloo Downs, a high level of breeding activity was observed amongst many species of dryland birds and some reptiles; this closely followed a period of unseasonal rainfall in the district. Most species recorded were common to abundant in their preferred habitat. This undoubtedly was the result of the unseasonably high rainfall and consequent excellent conditions prevailing during the survey period for fauna. Future surveys conducted in drier (more normal) years may indicate marked variations in abundance ratings, particularly of birds.

A significant factor involved in survival of the fauna has undoubtedly been the retention of extensive tracts of uncleared forest habitat throughout the shire coupled with the resilience of most of the arboreal species to changes that have occurred through European settlement. Other recent Queensland fauna surveys in inland Queensland areas (Kirkpatrick 1966, 1967, 1968; McEvoy and Kirkpatrick 1971) have also demonstrated the survival of the majority of native species in those areas to the present time, again with the retention of forest habitat a significant factor.

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