I INTRODUCTION TO DONGOLOCKING NATURE RESERVE

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Since 1972 the Western Australian Museum has been surveying the vertebrate fauna and vegetation of reserves in the Western Australian wheatbelt. The aims and objectives of this programme, and location of reserves are outlined in Kitchener (1976). Most of the reserves so far surveyed are located throughout the wheatbelt except the southwest edge. Dongolocking is one of two reserves selected for examination in this part of the wheatbelt. The area is of particular interest as it might be expected to include species usually found in the heavily timbered forest block to the west of, but not generally in the wheatbelt.

Location and History

Dongolocking Nature Reserve, located at 117°41'E and 33°04'S, is *ca* 180 km southeast of Perth and *ca* 24 km north of Dumbleyung. It consists of 4 contiguous reserves (Nos 19096, 19083, 19082 and 10473) which have a total area of 1061 ha. Between 1924 and 1972 these reserves were vested in the Forests Department for the protection and utilization of mallet trees, (*Eucalyptus falcata, E. astringens* and *E. gardneri*). The bark of these trees was used as a source of tannin for the hide tanning industry. Extensive 'stripping' of mallet which involves removal of the trees took place between 1920 and 1930, but none has taken place in recent times. In 1954, 15 reserves referred to as the 'Dongolocking series' by the Forests Department, including the present Nature Reserve, had a total area of 4,048 ha. However only 5% of this area carried mallet. Five of these reserves were subsequently alienated and opened for selection for agriculture. On 23 June 1972 Dongolocking Nature Reserve was gazetted for the conservation of flora and fauna and vested in the Western Australian Wildlife Authority. In addition there are 3 smaller, separate reserves (Nos 19085, 19086, 20070; see **Fig. 1**, Muir [this publication]) which have the same status as Dongolocking Nature Reserve. These were briefly examined in the course of this survey.

Prior to this survey nothing was recorded of the fauna of the Nature Reserve. A reconnaissance survey of the area was carried out between 23-27 September 1974 by D.J. Kitchener and A. Chapman. Between 15-25 October 1974, D.J. Kitchener, A. Chapman and J. Dell surveyed the Reserve. A repeat survey was made between 7-17 April 1975 by A. Chapman, B. Muir, J. Dell, J. Henry, W.K. Youngson and D.J. Kitchener (10-12 April). B. Muir undertook further fieldwork between 11 and 14 August 1976.

Physiography and Basic Geology

Dongolocking Nature Reserve is situated on the granites and granitic gneisses of the Yilgarn Block of the Precambrian Western Shield. Generally the distribution of vegetation is influenced by physiography with heaths on sand-plain and lateritic surfaces, woodland and mallee on pallid zone and clay derived soils and shrubland on sand over laterite. The only topographic relief is low laterite capped hills and breakaways. The 1:50,000 topographical cadastral map 'Muggerugging' 2431-IV, reproduced in part in **Fig. 1**, shows that the highest points on the Nature Reserve follow the 420 m contour (height above mean sea level) line near the south boundary. The lowest points follow the 370 m line near the north boundary. A small dam holds water during winter but there is no natural free water on the Nature Reserve, nor are there any watercourses which would hold water even temporarily after rain. Salt lakes and samphire complexes are absent from the Nature Reserve.

Fire History

Fire control by establishing firebreaks was practiced by the Forests Department at Dongolocking as early as 1933. The remains of these fire-breaks are visible on aerial photographs taken in 1972, although they are difficult to locate on the ground. Numerous peripheral firebreaks have been established since.

The Forests Department record fierce fires at the northern ends of reserves No. 19085 in 1928 and No. 19082 in 1954. These fires also damaged some of No. 19083. **Figure 2** indicates approximate ages of vegetation at 1976 following burning. It was compiled by examination of burn patterns on aerial photographs taken in 1960 and 1972, with photo-interpretation based on the appearance of patterns from areas where the year of burn is known. **Fig. 2** indicates that the entire Nature Reserve has been burnt during the past 50 years.

Agricultural Development and Isolation

Rates of alienation and clearing of adjoining natural vegetation are documented because the fauna of a reserve, particularly avifauna and other mobile species, e.g. kangaroos, possums and goannas, is dependent to a certain extent on the quantity and spatial arrangement of other uncleared land in its vicinity.

Gentilli (1961), shows that the district incorporating the Shires of Narrogin, Wickepin and Dumbleyung was approximately 70% cleared at

1961. The remaining 30% included forested lands, reserves of all kinds and uncleared land on private holdings. More precise data (**Table 1**) are extracted from Gentilli (1961) who excluded uncleared but grazed land from the 'total uncleared' category.

TABLE 1

Percentages of cleared and uncleared land owned privately or by the Crown in the Shires of Dumbleyung, Narrogin and Wickepin (after Gentilli 1961).

SHIRE	PRIVATE LAND			CROWN LAND	TOTAL UNCLEARED
	Cleared	Uncleared			
		Grazed	Unused		
Dumbleyung	61	2	14	23	37
Narrogin	65	8	10	17	27
Wickepin	75	5	14	5	19

The rate of clearing of land since 1960 within the immediate vicinity of the Nature Reserve can be determined by comparing aerial photographs taken in 1972 with photographs taken in 1960. The 80 chain photo-mosaic 'Doraking' based on 1962 photography is also used in the following analysis. The Nature Reserve can be considered to be at the centre point of an oblong area measuring 59 km x 47 km. This is derived by extending the dimensions of the Nature Reserve by 20 km from each of its most northern, western, southern and eastern boundaries. Twenty kilometres is an arbitrary figure which is to be used as a basis for comparison between this and other similar sized reserves in the wheatbelt.

The area thus circumscribed is 277,300 ha. In 1960 the total area of reserved and uncleared land within this boundary was *ca* 33,450 ha or 12% of the area. In 1972 this figure had been reduced to *ca* 15,030 ha or 5.4%. This situation is diagrammatically illustrated in **Fig. 3**. In 1960, 10,738 ha of uncleared land were immediately contiguous with the Nature Reserve; this figure had been reduced to 5,960 ha in 1972 and to 5,232 ha by 1976. Despite this reduction, the effectiveness of the Nature Reserve for conservation is still probably far in excess of that indicated by its gazetted area of 1,061 ha. This technique will, where possible, be applied to further work on wheatbelt reserves, so that rate and time of alienation can be quantified and considered as factors in comparing fauna between reserves.

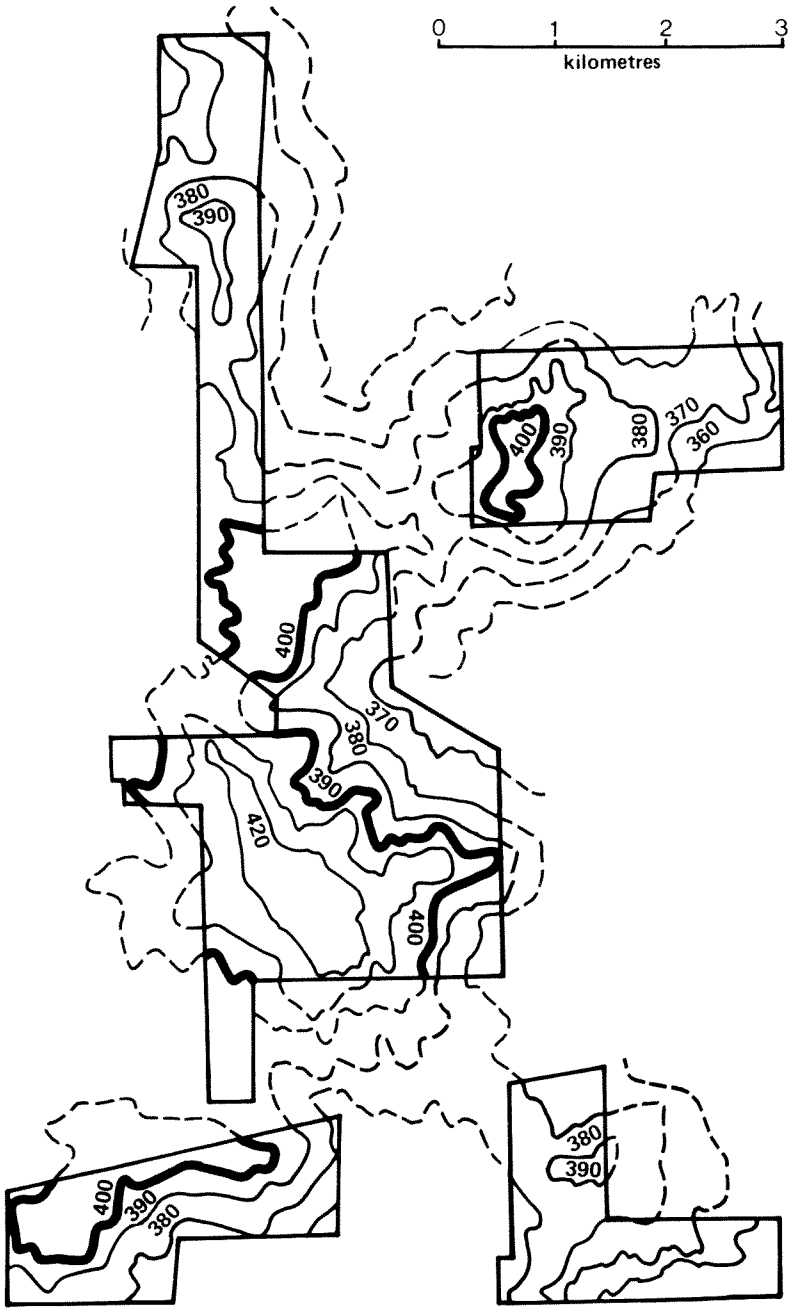

Fig. 1: Contour map of Dongolocking Nature Reserve. Contour interval is 10 metres. Heights are above mean sea level.

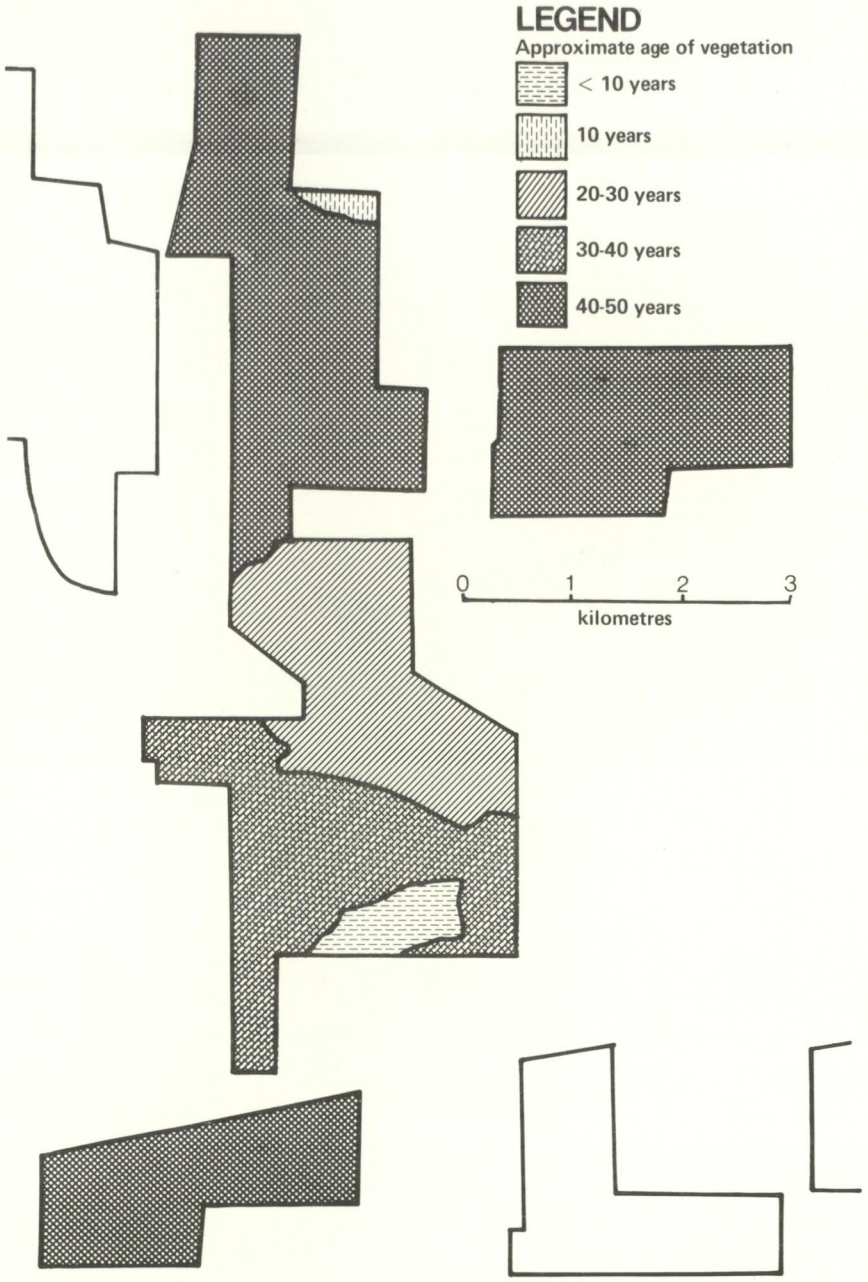

Fig. 2: Approximate ages of vegetation formations on Dongolocking Nature Reserve at 1976.

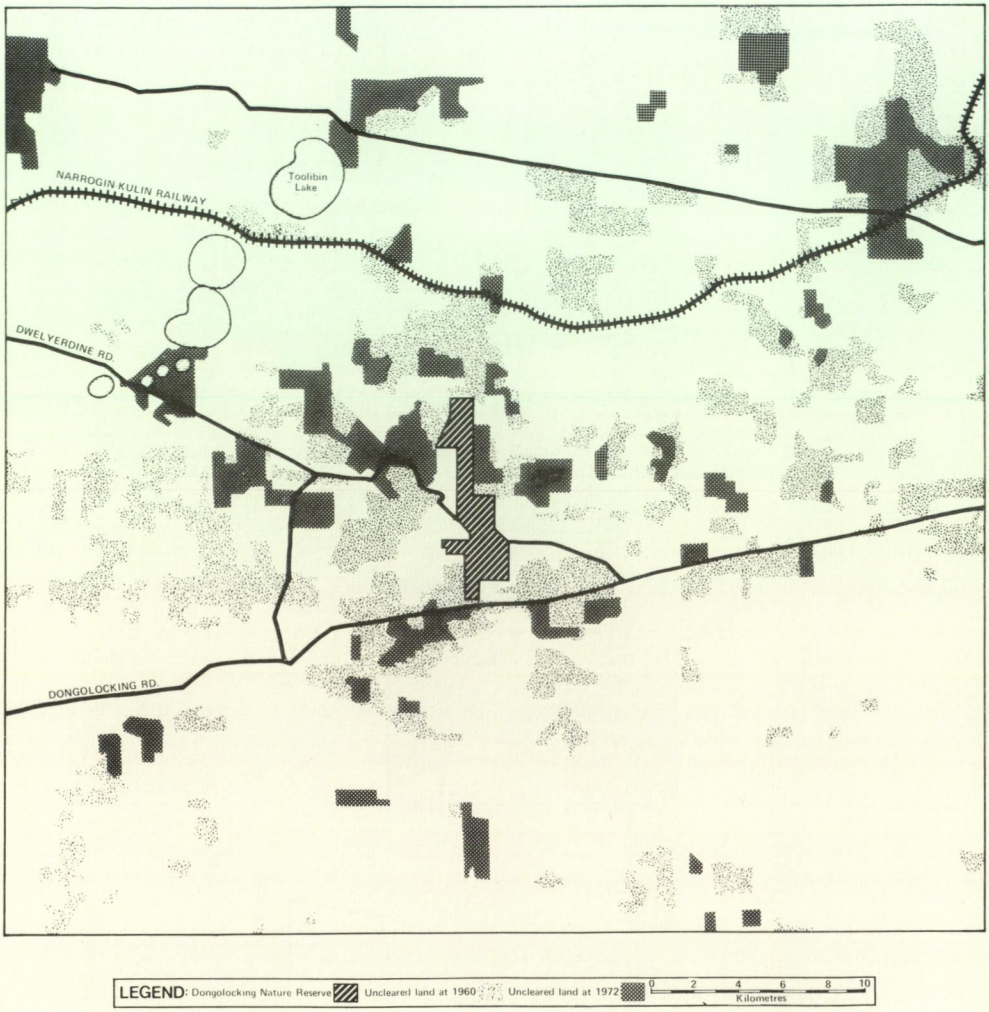

Fig. 3: Map of Dongolocking Nature Reserve and surrounds showing land cleared between 1960 and 1972. Blank areas were cleared prior to 1960.

The first settlement in the area was a pastoral lease taken up in 1885 at Dongolocking Spring which is *ca* 6 km east of the Nature Reserve. At this time sheep grazing was the only significant form of land use in the district. The first wheat crop in the district was planted around the turn of the century. Between 1900 and 1913, although there was no mechanization, there was rapid agricultural development which was temporarily curtailed by a major drought in 1914 (Klemm 1969). Between the Second World War and 1967, there was further large scale clearing of land in the district, due in part to the discovery that light land could be farmed by the application of trace elements.

Rabbits were first noticed in the district in large numbers in 1918 (Klemm 1969). Foxes probably arrived shortly thereafter as Leake (1962) records a similar sequence of events at Kellerberrin.

Climate

Climatic data are based on (a) rainfall records from Toolibin (*ca* 18 km NW of the Nature Reserve), (b) rainfall, temperature and humidity from Narrogin (*ca* 55 km west) and (c) winds from Lake Grace (*ca* 80 km east). Data are extracted from Anon. (1975) and (undated).

At Toolibin the annual average rainfall is 381 mm with an annual median of 368 mm.

TABLE 2

Highest daily rainfall (A) and monthly averages (B) in mm from Toolibin. Data from 50 years records.

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
A	40	112	56	42	48	64	42	32	78	46	27	46
B	11	16	18	26	52	69	63	47	30	25	12	12

Table 2 shows that although the highest daily rainfall at Toolibin sometimes occurs in the summer months, most rainfall (69%) occurs during the months May to September. At Toolibin above average rain fell in 1973 and 1974 (the 2 years preceeding the survey) with 405 mm and 511 mm recorded respectively.

Data on effective rainfall are not available at Toolibin but at Narrogin actual rainfall exceeds effective rainfall for on average 5-6 months of the year, from late April to October. Analysis of rainfall data for 75 years shows that periods in which actual rainfall is less than effective rainfall

always exceed 3 months and in 12% of cases exceed or equal 8 months duration. Evaporation in the region of the Nature Reserve is approximately 1,400 mm per annum.

During the October survey the weather was fine and cold to warm. Average daily maxima and minima at Narrogin for the period of the survey were 19.9°C and 7.5°C respectively (range 25°C-2°C). On 20 October about 25 mm of rain fell in the early morning and there was early morning drizzle on 22 October. During the April survey the weather was fine and warm to hot. Average daily maxima and minima at Narrogin were 24°C and 12.6°C respectively (range 32°C-9°C). Some rain fell on 14 April and there were early morning mists on two occasions.

TABLE 3

Temperature and relative humidity data for Narrogin (39 years records).

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Mean daily maximum (°C)	30.9	30.0	26.7	22.2	18.1	15.0	14.5	14.6	16.7	20.9	25.1	29.2
Mean daily minimum (°C)	14.7	14.5	12.8	10.4	7.4	6.8	5.3	5.0	5.8	8.0	10.4	12.5
9 a.m. mean relative humid. (%)	58	62	69	78	82	93	84	85	80	70	62	60
3 p.m. mean relative humid. (%)	33	36	45	52	57	75	67	65	58	49	40	35

At Lake Grace most summer winds are from the east, northeast, southeast. These are between 16-24 kph. Most winter winds are from the northwest and north. These are also between 16-24 kph.