CHAPTER 2 UPPER WARREN FAUNA MONITORING

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Abstract

The Upper Warren Fauna Monitoring component of the Woylie Conservation Research Project comprised biannual monitoring of 11 key transects within the Upper Warren area. Detailed demographic data was collected for all mammal species caught, with the aim of monitoring population change across the region. In addition, detailed health checks of all woylie individuals were conducted and a variety of samples were collected from all mammal species to be used for analysis of health, disease, diet and genetics. Of the eleven transects ten have shown significant recent decline. It remains uncertain when the declines began in some areas due to a lack of data between 1998 and 2005. For areas within the Upper Warren where there is sufficient data, declines appear to have started from 2002 – 2006 and are still continuing. By 2007, the Upper Warren transect populations had undergone a 95% median decline. Nine out of 11 transects currently have 0-8% capture rates (i.e. 0-15% of their pre-decline capture rates). Woylies currently persist at high capture rates at only one transect (Keninup), which has not yet undergone a contemporary decline. The remaining transect (Warrup) currently supports moderate capture rates but appears to have undergone a decline whilst monitoring was not undertaken in this area, between 1998 and 2001. Continued monitoring of the latter two transects, in particular, on a biannual basis is recommended in order to detect the beginning of any decline in a timely manner to enable greatest extraction of information.

2.1. Introduction

Cage trapping was conducted on a biannual basis along 11 transects in the Upper Warren area (Figure 2.1, Table 2.1) to monitor changes in woylie populations including abundance and demographics. Some key potential agents of population change were also monitored in association, where possible. These have been addressed in other sections within this report and include predators, food resources, and disease. This program has built on the monitoring and research activities conducted over the past 30 years to develop a longitudinal context to population changes.

Of the 11 transects, eight were routinely monitored by existing District, Science and training programs prior to the commencement of this project. Two transects were monitored on a biannual basis and the rest on an annual basis. In October 2005, three additional transects were established (one re-established, one extended and one new transect; Winnejup, Keninup2 and Corbal, respectively) to provide a more complete spatial assessment of woylie population changes within the region.

For this project, the monitoring of these 11 transects had:- expanded to biannual surveys, standardised methodology through development of monitoring protocols, become centrally coordinated and the timing of surveys synchronised.

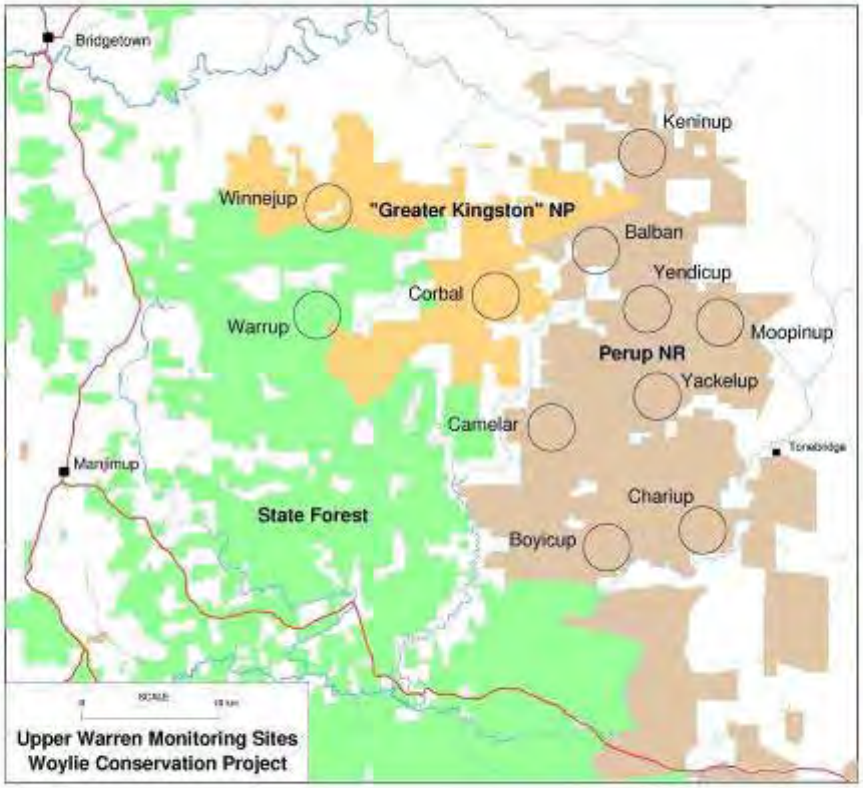

Figure 2.1. Upper Warren Fauna Monitoring sites.

Table 2.1. Locations, ownership and purpose of the transects comprising the Upper Warren Fauna Monitoring.

TRANSECT	LOCATION	AREA	OWNERSHIP	ORIGINAL PURPOSE
Keninup2	Keninup block west of Distributer Rd and North of Westbourne Rd. Transect extended for Woylie Conservation Project	Perup North	Donnelly District	Educational – Perup Ecology Centre.
Balban	Balban block – Numbat Rd	Perup North	Species and Communities Branch	Fauna Management Course Training
Moopinup	Moopinup block – Possum Rd and Stretch Rd	Perup Central	Donnelly District	Western Shield monitoring
Yendicup2	Yendicup block – Bandicoot Rd	Perup Central	Science Division	Bushranger and Long-term monitoring
Yackelup	Yackelup block – Old Boyup Cranbrook, Quenda and Mardoo Rds.	Perup Central	Science Division	Bushranger and Long-term monitoring
Camelar	Camelar block – Fordson and Camelarup Rds.	Perup Central	Species and Communities Branch	Fauna Management Course Training
Chariup	Chariup block – Mordalup creek system south of DeLangraaft Rd	Perup South	Donnelly District	Fire Effects Monitoring
Boyicup2	Boyicup block – Boyicup Rd and Orient Rd.	Perup South	Donnelly District	Western Shield Monitoring
Winnejup	Winnejup block – North, Walcott and Boundary Rds (subset of Kingston Study)	Perup South	Science Division	Kingston Study
Corbal	Corbal block – Eclipse, Morrison and Argument Rds.	Greater Kingston	Science Division	Woylie Conservation Project
Warrup2	Warrup and Kingston blocks – Warrup, Seaton Ross, Maisey and Wilson Rd (subset of Kingston Study)	Greater Kingston	Donnelly District	Western Shield Monitoring (Previously Kingston Study)

2.2. Methods

2.2.1. Upper Warren Fauna Monitoring Methodology

The biannual monitoring was conducted in October/November and March/April of each year (beginning October 2005). Trap setting, bait recipe, trap hygiene, trap clearing, animal processing, sample collection and data scribing were all conducted in accordance with the monitoring and hygiene standards and protocols described in; the Departmental 'Animal Ethics Standard Operating Procedures' (CALM, 2005), the local 'WCRP Operations Handbook (Volume 3)' and the Departmental 'Minimising Disease Risk in Wildlife Management' (Chapman *et al.*, 2005).

Each team had between two and four people depending on the sampling requirements and expected capture rates. The team comprised: an animal handler, a data scribe, a person trained in blood extraction (where required) and an additional assistant (where required). On some of the busier transects two teams were used to process the animals.

Standard processing of animals included:- age, identification tags/microchips, sex, breeding/pouch condition, pouch young biometrics, size and weight measurements for condition indices, parasite loading, body condition rating, coat condition rating, health comments and fate. In addition, full health checks were conducted on all woylies captured and additional sampling was conducted for many individuals. Additional sampling included blood, scats, and ectoparasites for disease screening; scats for dietary analysis (including predators); and ear tissue for DNA analysis. The methodology and results of this sampling has been discussed in Chapter 5 Disease.

2.2.2. WCRP Operations Handbook

An Operations Handbook has been developed through collaboration of Science Division, Donnelly District and Warren Region personnel over the life of the project in an attempt to standardise work procedures and data collection methodologies used during the WCRP fauna monitoring works. The handbook covers such things as data collection, terminology, hygiene, data validation, sample collection and animal and personnel welfare. This handbook was initially used to standardise the monitoring works involved with the WCRP, however it has now been adopted as the standard protocols for fauna monitoring works undertaken within the district and by other projects within the Department. The WCRP Operations Handbook is a working document and continues to undergo review and improvement. It is envisaged that this handbook will form the basis for the development of corporate fauna monitoring protocols. The Handbook will be sent to the *Western Shield* Operations and Research Committee for consideration as the foundation of the new corporate monitoring protocols. The WCRP Operations Handbook in its current form has been distributed for use by other fauna management programs and is being used in part or whole by: Department of Environment and Heritage in South Australia, Paul de Tores in the northern jarrah forest, Nicki Marlow in the wheatbelt and at Lorna Glenn.

See Volume 3 for the complete WCRP Operations Handbook.

2.3. Results

The history of surveys conducted prior to and as part of the WCRP are summarised in Table 2.2. All eleven transects have had four surveys conducted throughout the duration of the WCRP initial field component (October 2005 – June 2007). In addition, six of these transects have been surveyed in October/November 2007. One transect (Corbal) has no historical survey data, the remainder have had between five and 27 previous surveys conducted.

Table 2.2. Surveys conducted on each of the 11 Upper Warren Fauna Monitoring transects prior to and during the project.

TRANSECT	#SURVEYS PRE-2005	OCT/NOV 2005	MAR/APR 2006	OCT/NOV 2006	MAR/APR 2007	OCT/NOV 2007
Keninup2	5*	Y	Y	Y	Y	Y
Balban	6	Y	Y	Y	Y	Y
Moopinup	8	Y	Y	Y	Y	N
Yendicup2	12	Y	Y	Y	Y	Y
Yackelup	12	Y	Y	Y	Y	Y
Camelar	6	Y	Y	Y	Y	Y
Chariup	8	Y	Y	Y	Y	N
Boyicup2	9	Y	Y	Y	Y	N
Winnejup	22	Y	Y	Y	Y	N
Corbal	0	Y	Y	Y	Y	N
Warrup2	27*	Y	Y	Y	Y	Y

Note: * Number of surveys Pre-2005 for Keninup2 and Warrup2 transect include surveys conducted on Keninup1 and Warrup1transects respectively. These are very similar transects within the same area, with slightly different methodologies surveyed by different groups (e.g. slightly different transect locations, trapping frequency, etc)

All six of the monitoring transects within the Perup South and Central areas have shown significant and rapid declines commencing between 2002 and 2004. All have reached very low local population levels in the past two years (Figure 2.2). In the Perup North area, woylie capture rates commenced a rapid decline in 2006 on the Balban transect (76% decline based on surveys using 'smelly' bait or 32% decline based on surveys using 'universal' bait, within a 6-12 month period), yet continue to increase on the Keninup2 transect (Figure 2.3). The increases seen in woylie capture rates on the Keninup2 transect are likely to be, at least in part, an artefact of trap learning by woylies on the newly established transect.

Within the Greater Kingston area (Figure 2.4) the capture rates of woylies on the Warrup2 transect has declined significantly from those recorded during the Kingston Study on Warrup1 transect prior to 1998. Since re-establishment of a subset of the Warrup1 transect (Warrup2) woylie numbers remained fairly stable between 2001 and 2004 and have subsequently increased, coinciding with an increase in survey frequency from annual to biannual (i.e. at least some of this increase is an artefact of changed trapping frequency and trap learning by woylies). The Corbal transect has had a decrease in capture rates of woylies since it's commencement in 2005. The Winnejup transect was not monitored between 1998 and 2005. The capture rates were substantially less in 2005 (when trapping recommenced) compared with the capture rates in 1998. Since re-establishment of monitoring in 2005 there have been increases in capture rates, albeit at low levels.

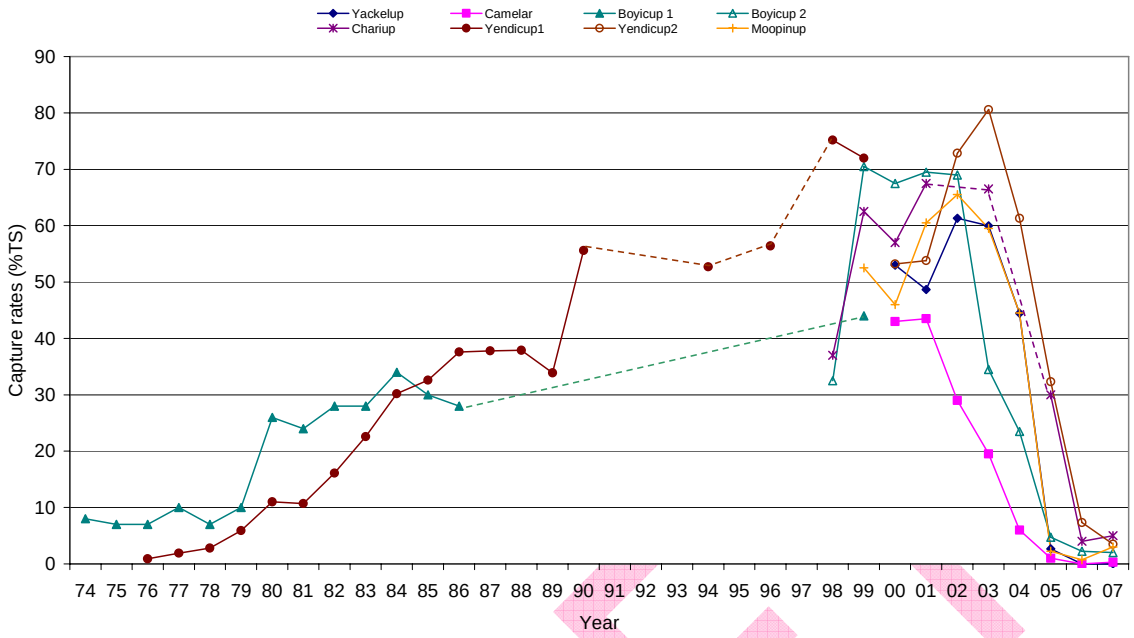

Figure 2.2. Capture rates of woylies over time on each of the Upper Warren Fauna Monitoring transects in southern and central areas of Perup Nature Reserve.

Note: Transect names with the suffix 1 and 2 distinguish relatively similar transects within the same area with slightly different methodologies surveyed by different groups (e.g. slightly different transect locations, trapping frequency, etc).

The dashed lines are indicative trends during the intervening periods between trapping events in non-successive years.

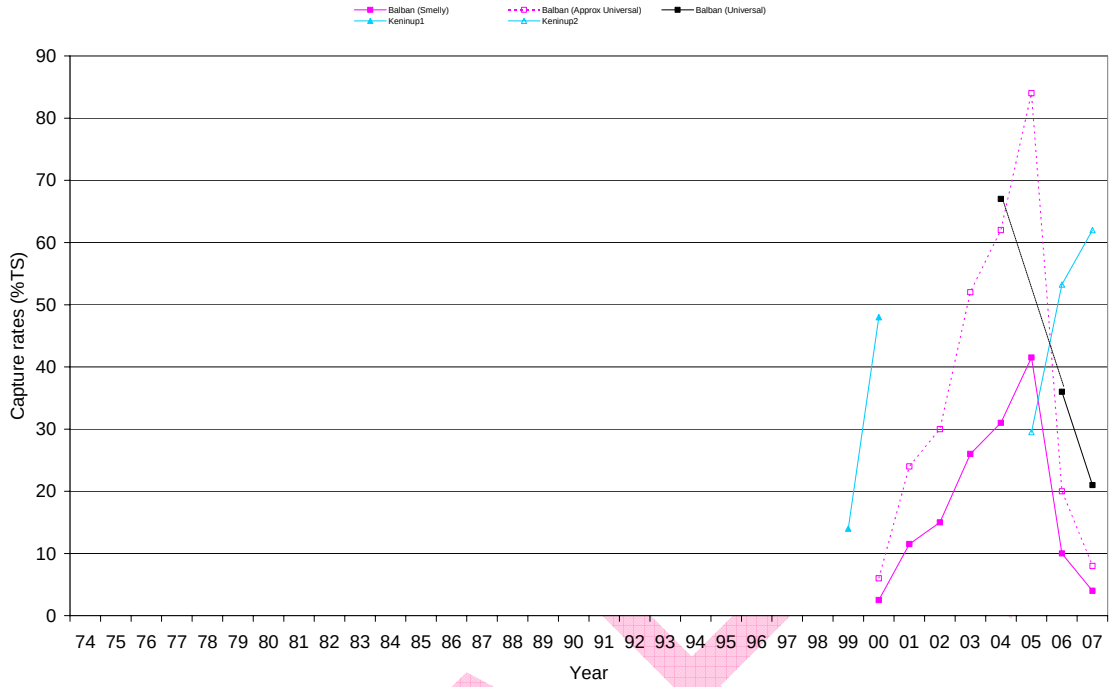

Figure 2.3. Capture rates of woylies over time on each of the Upper Warren Fauna Monitoring transects in the northern areas of Perup Nature Reserve.

Note: Transect names with the suffix 1 and 2 distinguish relatively similar transects within the same area with slightly different methodologies surveyed by different groups (e.g. slightly different transect locations, trapping frequency, etc).

'Balban (Smelly)' is an atypical transect given that it uses a pro-chuditch bait, which catches approximately 50% of the woylies than conventional universal bait.

'Balban (Approx Universal)' is an estimation of woylie numbers that would be expected to be caught on the Balban (Smelly) surveys, had universal bait been used instead of smelly bait (i.e. values = 2 x Balban smelly data)

'Balban (universal)' are surveys on the identical transect as Balban (smelly), the only difference being that universal bait was used throughout the survey rather than smelly bait.

The dashed lines are indicative trends during the intervening periods between trapping events in non-successive years.

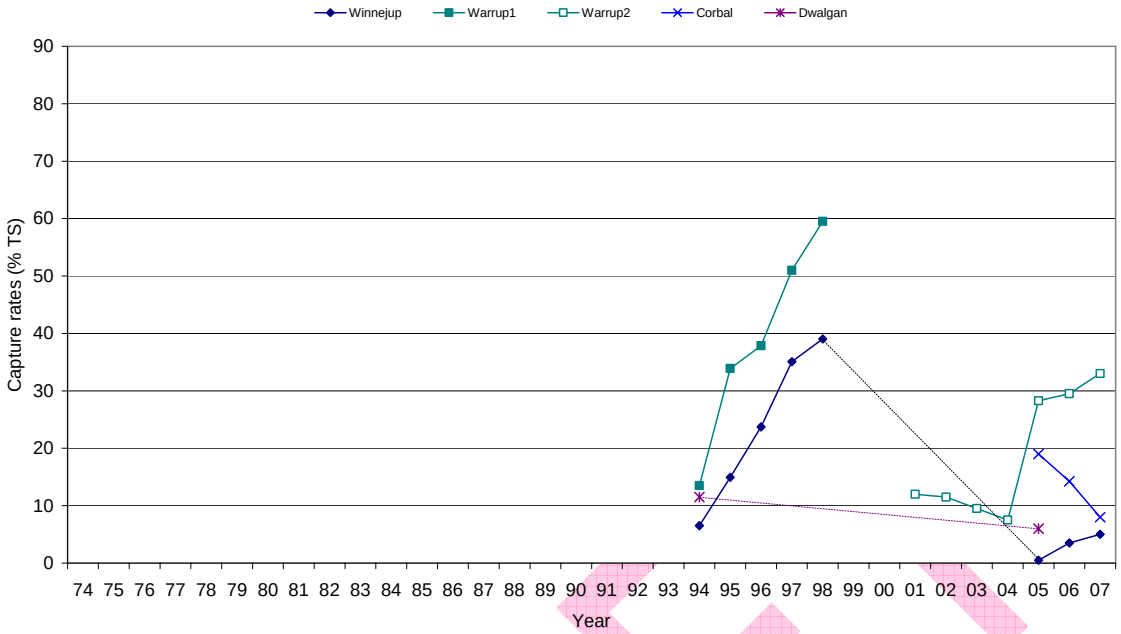

Figure 2.4. Capture rates of woylies over time on each of the Upper Warren Fauna Monitoring transects in the Greater Kingston area.

Note: Transect names with the suffix 1 and 2 distinguish relatively similar transects within the same area with slightly different methodologies surveyed by different groups (e.g. slightly different transect locations, trapping frequency, etc).

The dashed lines are indicative trends during the intervening periods between trapping events in non-successive years

Other data available for the area and from the Kingston study is not presented here due to differences in sampling methodology and confounding with timber harvesting activities making it inappropriate for direct comparison. Despite these differences, data from 1994-2000 and 2004/05 is consistent with the decline patterns observed elsewhere in the Upper Warren.

The pre-decline average for each transect has been calculated using the average of the woylie capture rates (%TS) for the three years immediately preceding the down-turn in the population (where possible). The pre-decline averages for Warrup2 and Winnejup transects were derived from the last 3 years of the Kingston Study monitoring data. The pre-decline average for Balban transect was derived from the 2004 trapping session using universal bait. Pre-decline averages could not be determined for the two newly established transects (Keninup2 and Corbal).

In summary, the mean and median extent of recent woylie decline (based on capture rates) in the Upper Warren has been 86% and 95% respectively (Table 2.3). It should be noted, however, that when considering the mean, the strong leverage of the higher capture rates on the Warrup2 transect should be taken into account. Seven of the nine transects for which there is pre-decline data, have declined by more than 90% of the woylie capture rates in 2007, when compared with their pre-decline average (Table 2.3).

Table 2.3. Summary of capture rates (% TS) of woylies and percentage of pre-decline population extant during 2005-2007 monitoring sessions on each of the 11 Upper Warren Fauna Monitoring transects.

	PRE-DECLINE	NOV 2005		APR 2006		NOV 2006		APR 2007		NOV 2007	
TRANSECT	AVE. %TS	%TS	EXTANT	%TS	EXTANT	%TS	EXTANT	%TS	EXTANT	%TS	EXTANT
Keninup2	-	30	-	51	-	56	-	64	-	59	-
Balban	67	42*	63%	36	54%	20*	30%	21	31%	4*	6%
Moopinup	62	0	0%	0	0%	2	3%	3	5%	-	-
Yendicup2	64	11*	17%	8*	12%	7*	11%	3*	5%	4*	6%
Yackelup	56	1*	2%	0*	0%	0*	0%	0*	0%	0*	0%
Camelar	43	1	2%	0	0%	0	0%	0	0%	1	2%
Chariup	62	22	35%	6	10%	2	3%	5	8%	-	-
Boyicup 2	69	6	9%	3	4%	2	3%	2	3%	-	-
Winnejup	33	1	3%	7	21%	1	3%	5	15%	-	-
Corbal	-	19	-	16	-	13	-	8	-	-	-
Warrup2	50	28	56%	33	66%	27	54%	33	66%	33	66%
NB: Pre-decline average for Balban derived from 2004									Mean (2007)		14%
* Balban, Yendicup and Yackelup - Universal bait only (extrapolated for Balban Nov sessions using smelly bait)									Median (2007)		5%

2.4. Discussion

All eleven of the Upper Warren Fauna Monitoring transects have had at least four monitoring sessions since the commencement of the WCRP in October 2005. All transects were monitored on a biannual basis in October/November and March/April each year during the initial field-based investigative stage of the WCRP (October 2005 to June 2007).

Significant declines in woylie populations (measured by capture rates) have occurred throughout most parts of the Upper Warren region commencing between 2002 and 2006 (Figures 2.2-4). The declines have been greatest in the Perup Central and Perup South areas with an average decline of 96% (Figure 2.2). In this area, three of the six populations have reached undetectable levels during the 2005 to 2007 period. It should be noted, however, that two of these populations have in recent times reached detectable levels once again and may well have commenced a recovery phase. Woylie populations have started declining more recently and continue to decline in some parts of Perup North (Balban) (Figure 2.3).

Three of the eleven transects (Warrup2, Winnejup and Keninup2) have shown differing responses to that of other transects during the period of recent declines, with no decline being observed between 2005 and 2007 (Figures 2.3-4). Increases in woylie capture rates around 2005/2006 on these transects (Figures 2.3-4) coincided with an increase in survey frequency from irregular or annual to biannual. It is expected that at least some of this increase is an artefact of changed trapping frequency and trap learning by woylies.

It should be noted that both Warrup2 and Winnejup transects have shown significant declines in woylie capture rates since earlier monitoring efforts prior to 1999 as part of the Kingston Study. Due to the absence of monitoring data between 1998 and 2001 (Warrup) or 2005 (Winnejup) the timing of the commencement of decline is unknown. In the case of the Warrup transect, it appears that decline commenced earlier than is apparent on other transects in the Upper Warren region. It is unknown whether the decline which has occurred here is related to the current declines being experienced. If in fact this does represent one of the earliest commencements of

the current decline, then it is possible that we are now monitoring a population in recovery phase (given the recent population increases).

The changes in woylie population abundance and demographics for each of the 11 Upper Warren Fauna Monitoring transects have been analysed in Chapter 3 Meta-analysis. It should be noted that two of the 11 transects were established in 2005 and therefore have no existing pre-decline data on woylie relative abundance.

2.5. Future work

With the completion of the initial phase of the Woylie Conservation Research Project, monitoring within the Upper Warren region will revert back to the standard monitoring programs conducted within recurrent budgets. This will mean that eight of the 11 transects will continue to be monitored on at least an annual basis.

It is recommended that the two transects (Keninup2 and Warrup2) which remain at highest densities and have yet to show evidence of significant recent decline, continue to be monitored on a biannual basis until the cause of decline has been substantiated. These transects may assist in the identification of the cause(s) of decline by providing supporting data (e.g. morphometrics, health checks, demographics, etc) as well as supporting the collection of samples for analysis (e.g. disease and diet). Through regular monitoring of these transects, a decline if it occurs, may be detected more rapidly allowing the opportunity to maximise the collection of data from individuals at the critical time of decline.

Over the next 12 months (2008), Keninup2, Warrup2, Yackelup and Yendicup2 (as a minimum) will continue to be monitored on a biannual basis. The eight transects which will continue to be monitored as part of ongoing monitoring programs provide representatives of high (H), moderate (M) and low (L) density sites (Table 2.4). These transects also provide representatives of currently declining, declined, stable and (potentially) recovering populations.

The protocols set out in the WCRP Operations Handbook (Volume 3) will continue to guide the monitoring standards and requirements for all future fauna trapping within the District. Additional sampling requirements will be determined by Science Division and within budget constraints.

Table 2.4. Planned monitoring sessions on each of the 11 Upper Warren Fauna Monitoring transects over the next 12 months (2008).

	MONITORING SESSION			
TRANSECT	**MAR/APR 2008**	**OCT/NOV 2008**	**NO. SESSIONS TO DEC 2008**	**WOYLIE DENSITY IN 2007**
Keninup2	Y	Y	2	H
Balban	N	Y	1	L
Moopinup	Y	N	1	L
Yendicup2	Y	Y	2	L
Yackelup	Y	Y	2	L
Camelar	N	Y	1	L
Chariup	Y	N	1	L
Boyicup2	Y	N	1	L
Winnejup	N	N	0	L
Corbal	N	N	0	L
Warrup2	Y	Y	2	M

2.6. Conclusion

A long history of monitoring data within the Upper Warren region has provided essential data for substantiating the extent of declines in woylie populations. Biannual monitoring of 11 transects spatially distributed throughout the range of the woylie in the Upper Warren region has shown continued declines on most of the transects – particularly within the Perup area. There are a variety of woylie population change patterns across transects including; stable, declining, declined and (potentially) recovering. Representatives of each of these should continue to be monitored on an annual basis as a minimum until the causes and mechanics of decline and recovery are better understood.

At the commencement of this project, the need for more thorough and rigorous protocols for monitoring was realized. During the project such protocols have been developed and these are now used as the standard for monitoring practices within the Donnelly District and beyond. These protocols have been put forward as the basis for a revised Departmental monitoring protocols.

2.7. Acknowledgements

We would like to acknowledge the contributions of Donnelly District, Manjimup Science Division, Warren Region and Wellington District staff and Fauna Management Course organisers and participants in the fieldwork components of the Upper Warren Fauna Monitoring program.

We would also like to acknowledge the large number of volunteers who have put in an enormous amount of time to assist with field works. Without the assistance of these volunteers the extensive and demanding field program would not be possible to achieve.

2.8. References

CALM, 2005. Department of Conservation and Land Management Animal Ethics Standard Operating Procedures. Department of Conservation and Land Management, Perth.

Chapman, T., Sims, C., Mawson, P., 2005. Minimising Disease Risk in Wildlife Management. Standard operating procedures for fauna translocation, monitoring and euthanasia in the field. Department of Conservation and Land Management, Perth.