Malleefowl Monitoring in Victoria: 2016/17

Report to the Victorian Malleefowl Recovery Group

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2

Contents

Appendices

Appendix A 1. 2016/17 Mound Inspection Report for All Victorian Sites

Note: The appendices that are usually printed with this report are available for member download from the national Malleefowl monitoring database.

1. Monitoring effectiveness: how did we do?

Table 1 shows a breakdown of the effectiveness of the monitoring effort and the overall result is impressive; more detail is shown in Appendix A.1. The VMRG visited 1251Malleefowl mounds during the 2016 (2016/17) breeding season (Table 1) including 1 newly listed mound. This result is less than last year because optional 5-year mounds were mandatory in 2015)

A total of 13 regular mounds appear to have been neither sought nor found during the 2016 season and these were scattered through 10 sites. There were also 5 regular mounds that were searched for but could not be found although they were found in previous years (coincidentally, these results were similar to last year, but involved different sites and mounds).

Overall, we managed to find 98.6% of the mounds that we set out to monitor (excluding newly added mounds). This result includes the optional '5 year' mounds which were monitored even though they were optional (see below). The next time optional mounds will be mandatory will be in 2020.

Table 1. Effectiveness of the monitoring effort. '5yrold' mounds are those that were categorised as optional before the 2015 season, whereas '5yrnew' are mounds that were added to the optional list last year. Omitted mounds are those removed from monitoring lists last season.

	Total	Regular	5yrold	5yrnew	Omitted
Sought and found	1250	1131	105	13	1
New incidental	1	1	0	0	0
Sought, NOT found	7	5	0	1	1
NOT sought or found	141	13	123	5	0
Total	1399	1150	228	19	2

Last season 19 mounds were monitored as regular mounds but were reviewed and marked as optional (5 year mounds) for this and later seasons; these mounds show up in the tables as new optional mounds this season. This brings the total number of mounds on the optional list to 247, or about 19% of our total monitoring target.

Optional mounds were also well represented in the mound visits. Monitors inspected about 43% of the optional mounds this season (105 of 247). Next season the optional mounds will again be optional: if you can visit these optional mounds, please do, even if it's only to take a photo and move on (simply finalise the record on Cybertracker after taking a photo by selecting the down arrow).

2. Malleefowl Breeding numbers: how did the birds do?

Of the 1251 mounds that were monitored in Victoria in 2016/17, 144 were active compared with 118 last season and 148 in 2013/14. This is a good result but still much less than the record of 218 set in 2012/13 (these totals include mounds out-of-site boundaries).

Figures 1-3 show the usual graphs that we produce each year to track the trends in breeding numbers in set areas where we have been monitoring the longest. The first comprises 7 sites that we have been monitoring since 1986 (Figure 1) and it is clear that at these sites, mostly in the eastern Big Desert region, breeding numbers were well down. One of our key sites, Bronzewing v04, which typically had 12-15 active mounds, was thoroughly burnt in January 2014 and consequently there was little breeding there this season (although, surprisingly, 5 mounds were active in 2016 and 2 last season). However, the low breeding numbers in Figure 1 wasn't simply due to v04 being burnt: when data from this site are excluded the poor breeding numbers at other sites is apparent. In fact, breeding numbers for this set of 6 sites was one of the lowest recorded over the past 29 years; breeding numbers were lower only in the 2002 drought and last year.

Figure 2 shows the trend for a larger set of 23 sites monitored since 1996 and scattered over a much greater geographical area, albeit for a shorter period, and Figure 3 shows the same data broken down into regions. While breeding numbers have improved in all regions compared to the very low numbers last season, there are worrying signs of continuing decline in the Eastern Big Desert and North East.

Elsewhere, in the six main sites in and around the Little Desert (v24, v25, v28, v36, v38 and v39) breeding numbers were much higher than last season and about average for previous years. At the four Wychitella sites (v29, v31, v32, v33) breeding was recorded in both the Korong Vale (v33) and Wychitella (v32) sites where a total of 3 mounds were active: this is a good result for this region where we usually record less than this, although there were 4 active mounds in 2009 and 2010.

We made special mention of Mali Dunes (v41) south of the Big Desert in last year's report because of a spectacular rise in breeding numbers since Bernie and Sue started monitoring there in 2013. We have great pleasure of reporting that there were 8 active mounds at v41 again 2016.

- *Comparing 2016 results with previous seasons using ALL the data*

Another way of representing how the results of the current year measures up against previous monitoring efforts is to compare the 2016 results directly with each of the previous years on a site by site basis (Figure 4a). This approach uses virtually all the data collected in the past.

Figure 4a shows that on a site by site basis, breeding numbers across Victoria in the 2016 season was 20% higher than last year, but nonetheless was lower than most other seasons since monitoring began. This is graphically represented by our Malleefowl Breedometer (Figure 4b) which displays the ranking of the current season breeding numbers with respect to other seasons where at least 10 sites were monitored. 2016 was the 7th worst of the 26 breeding seasons on record. Let's hope the needle continues to shift to the right next season.
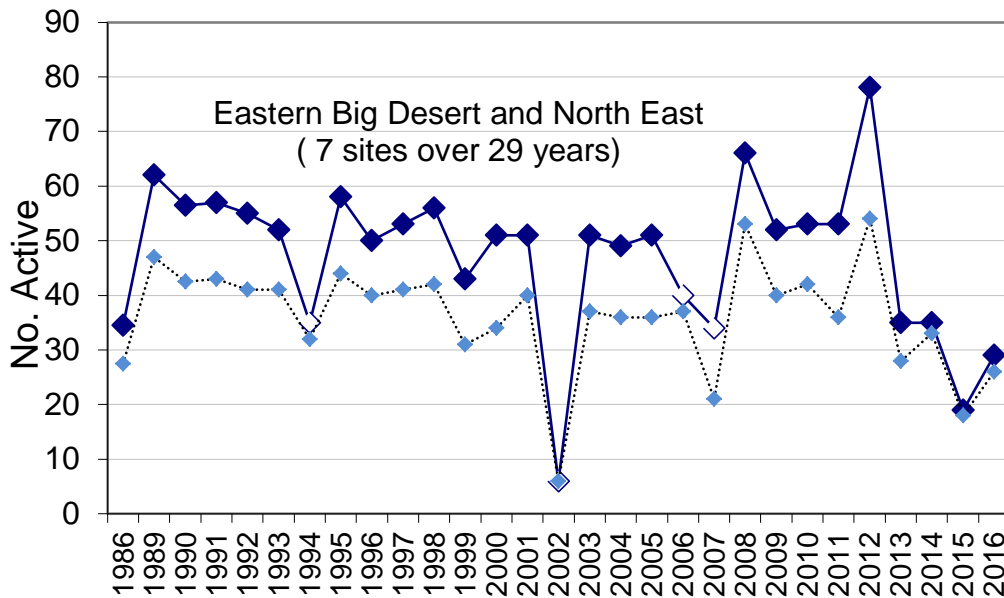
Figure 1. Trends in Malleefowl breeding numbers at 7 of the longest monitored sites over the past 29 years (upper graph), and at 6 of these sites excluding v04 (lower graph). 1994, 2002, 2006 and 2007 were major drought years (white points). Data comprise mounds in set areas across years in sites v01, v02, v03, v04, v07, v20 and v23.
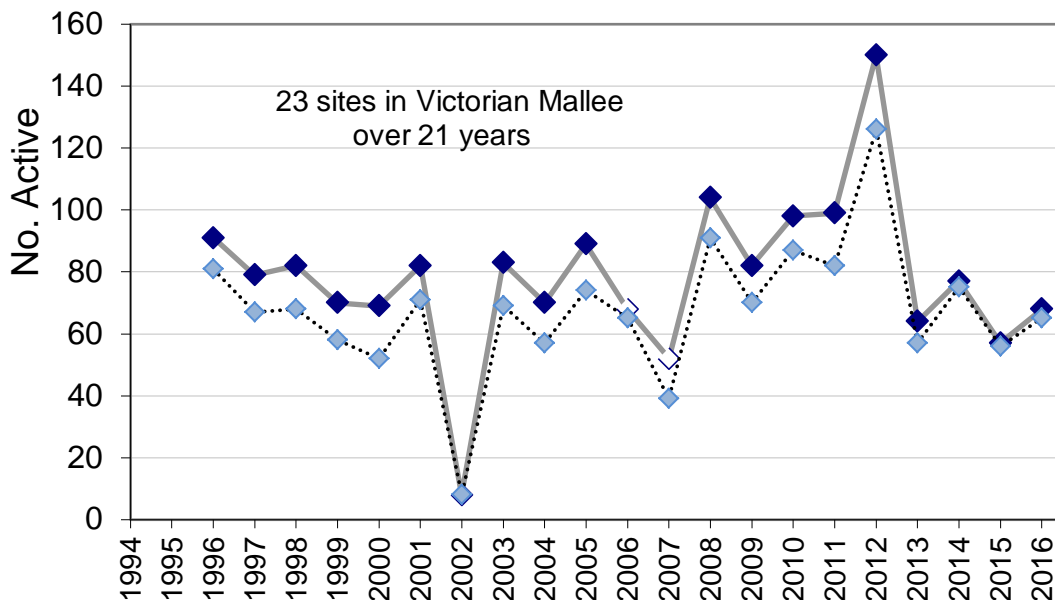

Figure 2. Trends in Malleefowl breeding numbers at 23 sites over the past 21 years (upper graph), and at 22 of these sites excluding v04 (lower graph). 1994, 2002, 2006 and 2007 were major drought years (white points). Data excludes mounds outside site boundaries. See figure 4 for regional breakdown.
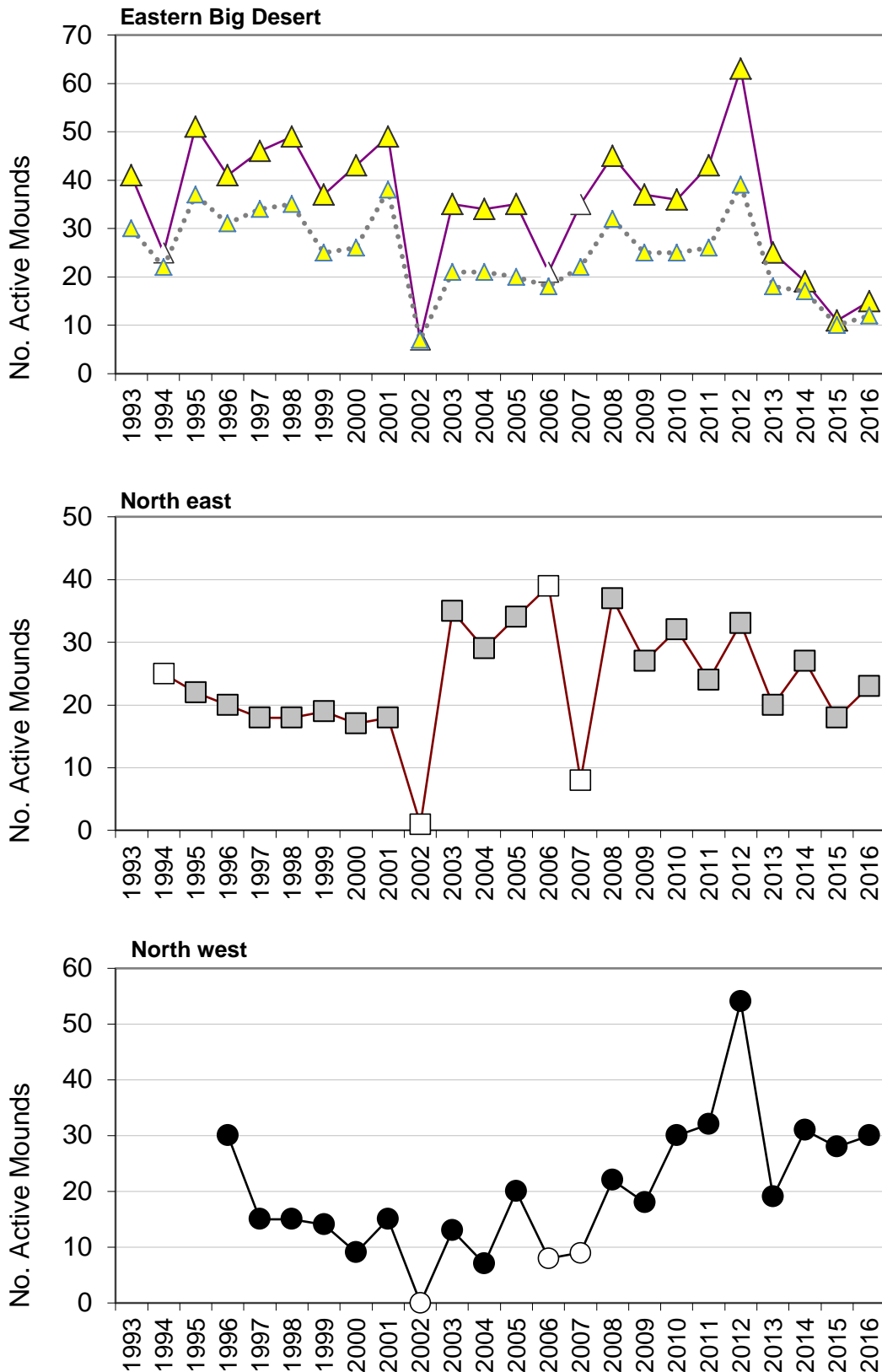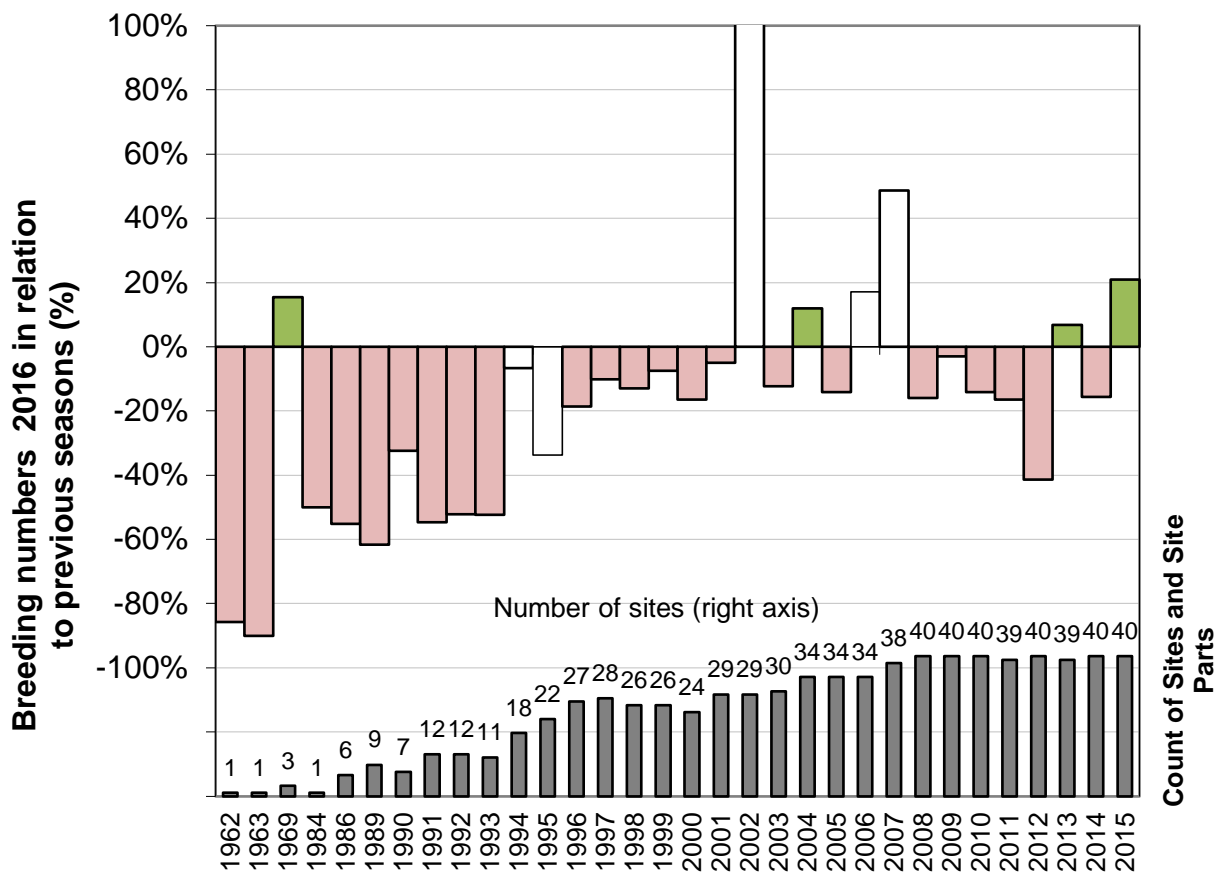
Figure 3. Trends in Malleefowl breeding numbers at 22 sites over the past 21-24 years shown by region. Eastern Big Desert (triangles) comprise 6 sites over 22 years (upper graph), and 5 sites excluding v04 (lower graph), North East comprise 4 sites over 22 years (shaded squares), and North West comprises 12 sites over 20 years (solid circles). 1994, 2002, 2006 and 2007 were major drought years in many areas. Data excludes mounds outside site boundaries.
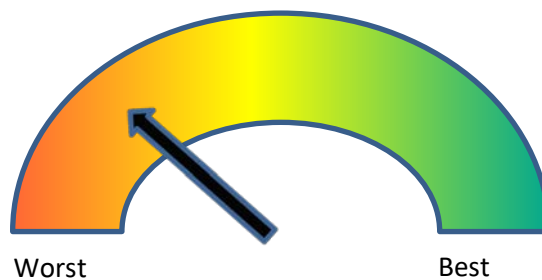
Malleefowl Breedometer
2016: 7/26

Figure 4. a) Breeding numbers of Malleefowl in the 2016 season compared with all previous seasons (upper chart) and the number of sites involved (lower chart). The zero line in the chart indicates no difference, whereas values above zero indicate that breeding numbers in the current season were above those in the past, and values below zero indicate a decline. For example, breeding numbers in 2016 were about 30% below those in 2014 but 20% higher than those in 2007. Drought years are indicated by unfilled columns.

The bottom chart shows the number of sites involved and provides an index of the reliability of the comparisons: e.g. the comparison with 2012 is based on 40 sites and is thus very reliable, whereas the comparisons with 1969 is based on only a 3 sites and probably does not reliably reflect general trends.

b) Malleefowl Breedometer summarising Figure 5a for the seasons in which there were at least 10 sites in common with 2015 data. The 2016 season was the 7th worst result of the last 26 seasons.

- *Rainfall profiles in 2016*

Following a dry start to the year (although there were heavy rains in January), rainfall during the crucial May-August period was slightly better than usual (Figure 5) and this most likely led to the higher breeding numbers than last season.   September rainfall was particularly high in north western Victoria, but was probably too late to influence breeding numbers.
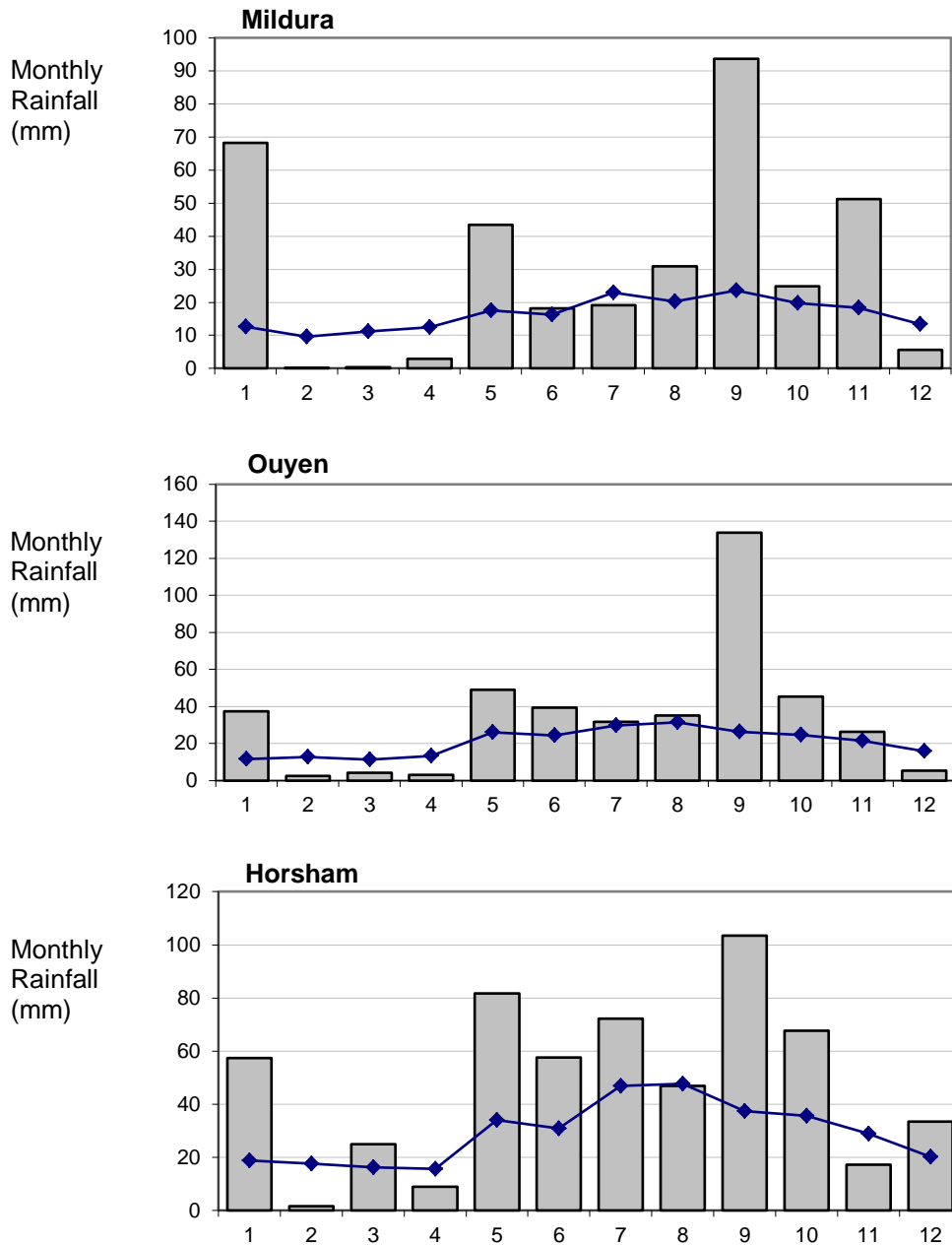
Figure 5. Rainfall at Mildura, Ouyen and Horsham in 2016 (bars) and median rainfall since early 1900s (line).   (Data from the Bureau of Meteorology website).

Individual Site trends

Rather than print out the 40 odd histograms showing site trends, these will be available for download from the NMMD (National Malleefowl Monitoring database) along with all the usual database reports that comprise the appendices of previous monitoring reports.

3. Changes to data recorded in the field

There were no major changes to the Cybertracker sequence this season and most people used the LG and Samsung smartphones successfully. Following the loss of data last year when a couple of smartphones spontaneously reset themselves, we commissioned Cybertracker to develop a backup to the external SD card to avoid data loss in the future. All of our smartphones now have this automatic feature.

4. Lerp

Lerp abundance on mounds was low: only about 3% of mounds had lerp on them in 2016 (Figure 6) when mounds were monitored (mostly October-December). Lerp was most commonly recorded in the Sunset Country sites where 13% of mounds showed lerp, but was virtually non-existent in other regions (Figure 7). Most sites in the Sunset had few if any lerp, but at one site (Bambill v13) over 60% of mounds had lerp on them and this bolstered the regional total.
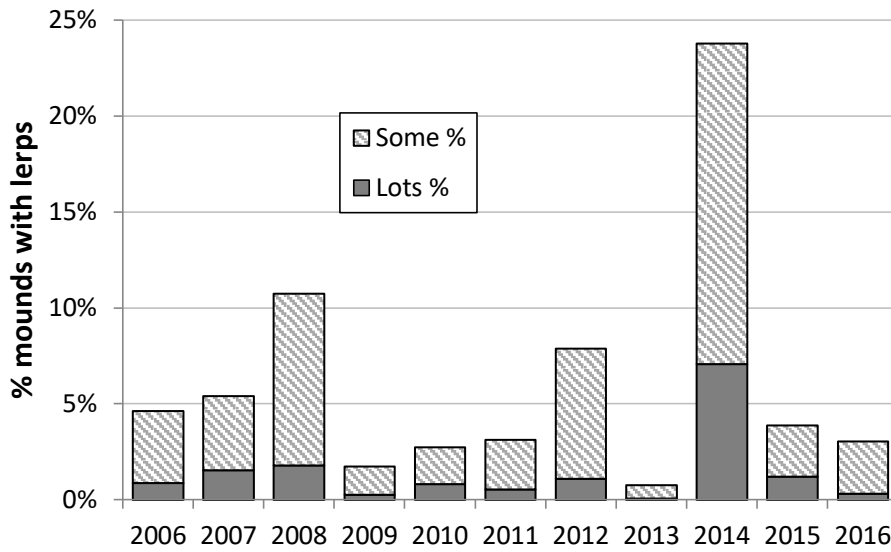
Figure 6. Proportion of mounds on which lerp were detected in each season since 2006.
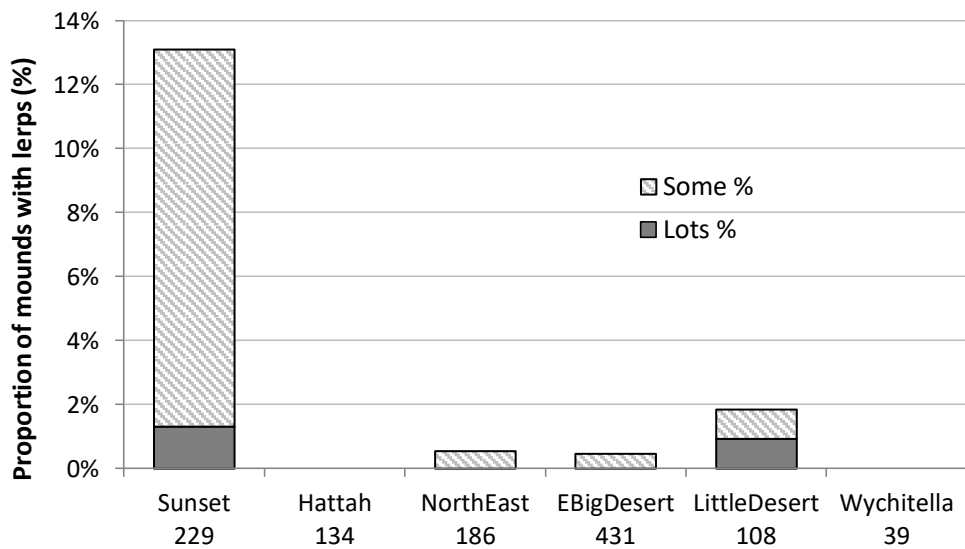

Figure 7. Regional breakdown of lerp occurrence on mounds in the 2016 season.

5. Fox scats

Fox scats were collected at 461 mounds in 2016 and weighed a total of 5.5 kg, a result that is lower than last season particularly considering that more sites were sampled in 2016 representing an extra 560g of scats (Table 2). Figure 8 shows the average weight of fox scats collected per mound monitored since the mid-1990s for the same set of 20 sites and provides a better comparison across the years of data during which many sites have been added. The graph shows that there was a steep decline in fox scat weights between 1996 and 2000 which coincides with and probably reflects the decline of rabbits due to RHD and consequent adjustments to fox populations. Since 2000, there was an increasing trend peaking in 2012, after which the amount of fox scat collected has steadily declined to about half of that of 2012. It is possible that the generally dry conditions over the past few years that have inhibited Malleefowl breeding have also deleteriously affected foxes.
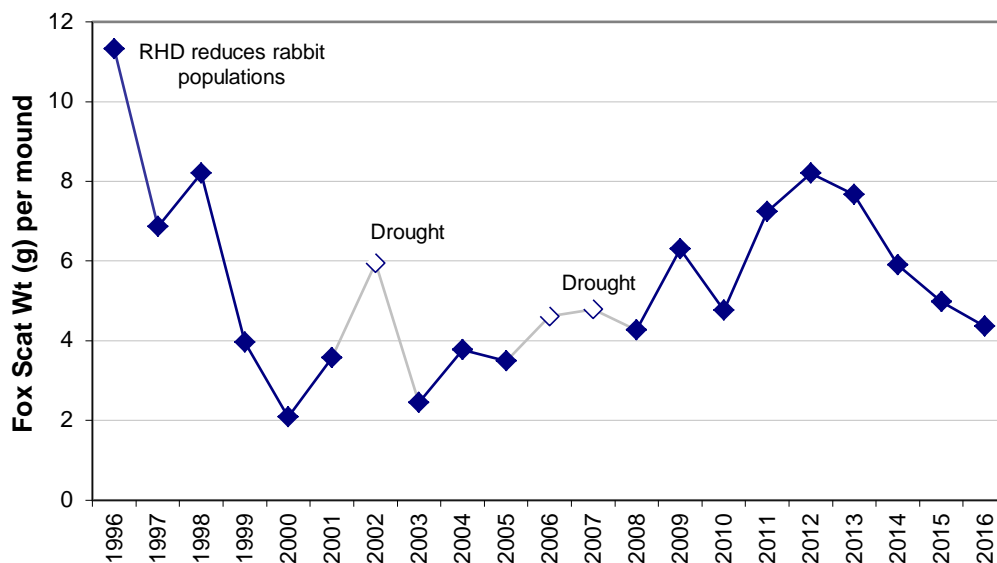

Figure 8. Trends in the average fox scat weight per mound at 20 sites over 21 years. No attempt has been made to control for biases due to variations in the proportion of active mounds (more likely to be marked with fox scats) or changes in the proportion of very old and inconspicuous mounds.

Which brings us, as always, to reiterate:

May we remind everyone once again of the importance of being very systematic with fox scat collection. We must search the mound surface very carefully for a full minute to be to absolutely sure that we get all the scats, as emphasised in the manual and during the training weekends.

Table 2. The total weight of fox scats, the number of mounds at which fox scats were collected, for both 2016 and the previous year (italics). Malleefowl scats and feathers were also collected in 2016 but are not tabulated here.

Grid	Name	Fox Scats			
		2016 Wt (g)	2016 Count	*2015 Wt (g)*	*2015 Count*
v01	Dattuck	326	19	*244*	*16*
v02	Torpeys	20	2	*159*	*12*
v03	Wathe SW	762	46	*520*	*27*
v04	Bronzewing	291	33	*647*	*43*
v05	Colignan	34	7	*40*	*4*
v07	Annuello	141	15	*152*	*14*
v08	Powerline	66	8	*79*	*5*
v09	Mt Hattah	15	4	*23*	*3*
v11	Mopoke	79	6	*73*	*5*
v12	Pheeneys	134	11	*48*	*7*
v13	Bambill	83	21	*191*	*20*
v14	Menzies	0	1	*103*	*6*
v15	Wandown	408	42	*199*	*15*
v16	South Bore	320	38	*236*	*22*
v17	OneTreePlain	22	3	*55*	*7*
v18	Washing	61	13	*59*	*6*
v19	Underbool	6	1	*11*	*2*
v20	Lowan	182	18	*369*	*25*
v21	Dumosa	248	16	*287*	*19*
v22	Dennying	54	6	*15*	*2*
v23	Moonah	920	47	*1286*	*54*
v24	Kiata	18	4	*108*	*9*
v26	Hattah Tracks	307	23	*215*	*18*
v27	O'Brees	55	7	*125*	*10*
v28	Nurcoung	150	6	*28*	*4*
v29	Wedderburn	28	4	*15*	*3*
v30	Hattah South	73	3	*57*	*3*
v31	Skinners Flat	17	2	*10*	*1*
v32	Wychitella	13	2	*6*	*2*
v33	Korong Vale	19	1		
v34	Paradise	417	15		
v35	Broken Bucket	119	19		
v36	Boughtons WH				
v37	Wisemans	19	3	*16*	*2*
v38	Tooan	5	3		
v39	Oldfields	46	3	*83*	*6*
v40	iluka	0	1	*9*	*1*
v41	Mali Dunes	73	8	*101*	*8*
		5531	*461*	*5569*	*381*

6. Participation and in-kind contribution

This year, VMRG members and non-members participated in the monitoring and totalled about 1484 monitoring hours in the field. In addition, VMRG members totalled at least 478 hours driving to and from monitoring sites (including passenger time). Assuming the time spent by VMRG members is worth $34.86/hr*, we estimate the field component of the monitoring represents at least $68,395 in in-kind support.

Of course the VMRG in-kind contribution extends further than just the field component of monitoring. We estimate that an additional 120 hours were contributed in managing the monitoring effort (preparing data and equipment, posting, uploading and managing data on the NMMD), and at least 120 hours were contributed freely by VMRG members to the motion camera project (installing, checking and downloading camera traps and processing photos). Other large unpaid contributions in 2015/16 include committee meetings, training weekends or reporting back meetings, which collectively involved well over 160 unpaid hours, and ground truthing of LiDAR scans in the Little Desert led by Iestyn Hosking which involved at least 100 person hours.   Together, these activities totalled about 500 hours and were worth at least another $17,430.

Thus, we conservatively estimate the in-kind value of the VMRG activities in 2016/17 to be at least $85,825.

*estimate for volunteer hour value in 2015/16 from: Ironmonger, D. (2012). The Economic Value of Volunteering in Victoria. The Department of Planning and Community Development (Ed.): Victorian Government.

7. Concluding comments

Once again, the VMRG has collected excellent data and made a critically important contribution to Malleefowl conservation. We need information on the trends in Malleefowl breeding numbers and, realistically, this is only achievable through the efforts of a voluntary, citizen-science workforce. The VMRG continues to lead the way in Malleefowl monitoring and conservation, and the data and efforts by so many individuals in the VMRG are a credit to the group and an inspiration to others.

This season, breeding numbers were higher than last year but still lower on a site-by-site basis than most previous years despite generally good rainfall during the critical winter months. Fox numbers appear to be declining too, and it is possible that both these results are related to generally poor winter rainfall over the previous few years. Although winter rainfall was generally good in 2016, the previous years of poor conditions may have taken their toll on both Malleefowl and foxes. We, and no doubt the mallee farmers, hope for good winter rains in 2017 and that the monitoring by the VMRG will show further improvements in Malleefowl breeding numbers (but not necessarily fox numbers!).

- *Update on the motion-sensitive camera project*

As discussed in last year's report, we installed 48 cameras traps (with solar panels, batteries and stakes) at six sites in early winter 2015, including Wathe v03, Menzies v14, Wandown v15, Lowan v20, Dumosa v21, and Paradise v34.   These camera traps are scattered through the mallee (not at mounds) and patiently take photos of any animal or other object that passes in front of them, day and night, 365 days a year. We only visit them once a year during the monitoring to swap memory cards, so the effort by monitoring folk in the field is small, but the rewards are substantial in terms of estimating the populations of various animals such as foxes, cats, goats, pigs, rabbits and kangaroos, all of which might affect Malleefowl numbers.

In the past year VMRG members processed the photos collected last year during the 2015 monitoring and, during the mound monitoring, swapped the memory cards at all cameras in the field. Overall, everything went smoothly, although of course there is always room for improvement and we constantly strive for this.

Firstly, the processing of the 48,000 photos collected by the camera-traps in 2015. That's a lot of photos, but really only represented about six months of results because the camera traps were only installed in May and downloaded in November 2015. Nonetheless, we had so many people keen to lend a hand at processing the photos that we were able to send out the same batch of photos (usually in batches of 9,000 photos) to up to five people for sorting and thereby obtain a measure of just how much people vary in their identifications. Understanding how variable observers may be in processing photo is important for knowing how much faith we should have in the results, and it's also important for devising strategies for correcting errors that people may make. Anybody who has tried identifying animals in camera-trap photos will know that there are ample opportunities for observers to differ: animals don't always make it easy and often a tail or nose or other bit is all an observer has to go on; sometimes the photo is too dark, or too light, or its foggy or unclear for some other reason; and even when the photos are clear and the animal posing nicely, it's easy to miss something when you're tired and looking at so many photos, or to accidentally sort the photo into the wrong species folder.

So how variable were our observers? For the most part, observers were very consistent: although there were differences between observers, these were generally small and inconsequential. There were a couple of cases where people accidentally placed a bunch of photos in the wrong category, so we do need to error check our photo processing, but these errors were easily detected and corrected. On the basis of these results, next season we'll probably just need two people to examine each photo (rather than 5!) and may also introduce some other quick checking techniques. And another positive result: just about everyone who processed photos is keen to do it again (it's kind of fun!).

We have not really analysed the results yet, and of course we don't have the data to talk about trends yet. But we can report that of the 47,655 photos there were 3259 identifications, or a 'trap' success of about 7%. Kangaroos, rabbits, foxes and emus were all well represented, and Malleefowl were snapped surprisingly often as well. Also surprising were Swamp Wallabies (*Wallabia bicolor*) photographed numerous times at both Wathe and Lowan (Wyperfeld) monitoring sites.

However, a clear area for improvement concerned sorting techniques for Mac users. About one quarter of our keen photo sorters are Mac users and we have failed to find a way for them to process photos as efficiently as on a PC (where we use Faststone image browser). We have tried various things but with little success. Instead, we have decided to buy a PC laptop, set it up for processing, and send it to our Mac users with the hope that they find this easier.

A common complaint by photo sorters was the sometimes large number of 'nulls' where the camera was triggered by a moving leaf, shadow or whatever. It gets pretty tedious going through thousands of photos without seeing anything of interest: you can sometimes literally watch herbs grow! We will try to reduce this problem by moving or swapping cameras, but unfortunately there is only so much we can do. On a positive note, it is very quick to scroll through photos that have no animals in them (and how often do you get to watch time-lapse plant growth?).

The second task involving camera-traps was for monitors to swap the SD cards on the field cameras, check them over, and return the cards to us. This also went very well, although there have been occasional camera-trap causalities due to foxes and the like pulling or chewing cables. However, monitoring folk did very well and next season we will have some Cybertracker screens for the camera-traps to make things easier to record.

Thank you to the members who offered their services for this project! The results so far are very positive: while we need to improve some processes the results augur well for using the camera-traps to monitor the trends in predators and competitors of Malleefowl. Measuring these trends is vital for understanding the threats to Malleefowl and also for measuring the effectiveness of management (e.g. whether baiting foxes actually reduces their numbers appreciably, and whether this increases cat numbers). These are important issues, and our methods are especially relevant to the AM project across the continent that also uses camera-traps.

- *Update on the LiDAR project*

Belinda Cant (Department of Environment, Land, Water and Planning) organised a LiDAR scan of parts of the Little Desert in 2016, and VMRG members have been assisting by ground-truthing the large number of potential mounds that were detected. Iestyn Hosking (VMRG) is leading this ground-truthing project which is still underway with lots of potential mounds yet to be examined by him and his team. Belinda will use the results to gain a better idea of the habitats inhabited by Malleefowl in this large landscape, and particularly the response of Malleefowl to different stages of habitat recovery after fire.

This is very important and exciting work through which we will learn a great deal about Malleefowl in the Little Desert. We also hope that it will provide the foundation for the first Adaptive Management Predator Experiment site in Victoria: managers are keen to bait foxes in the Little Desert, and through Belinda and Iestyn's efforts, and those of their helpers, we hope to find a suitable pair of similar sites where one is baited for foxes and the other not. We will no doubt hear more of the Little Desert LiDAR project as it progresses.

Appendix A 1. 2016/17 Mound Inspection Report for All Victorian Sites

Mounds that will be included in future annual lists.

	Sites	1	2	3	4	5	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
Sought and found	1131	52	47	70	93	15	55	17	16		14	25	39	17	84	45	27	26	20	53	33	11	63	10	6	30	20	22	9	8	10	10	5	59	10	7	51	19	10		11	8	4
New incidental	1																																	1									
Sought, NOT found	5		1		1																																1	1	1				
NOT sought or found	13		1	1	1		2				1				1					1					2							1										2	
Total	1150	52	49	71	95	15	57	17	16		15	25	39	17	85	45	27	26	20	54	33	11	63	10	8	30	20	22	9	8	10	11	5	60	10	7	52	20	11		11	10	4

Previously Marked Mounds that will be checked every 5th year.

	Sites	1	2	3	4	5	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
Sought and found	105	15	6	8	6	1	1	2			2	2		1	2		3	2	2		2	8	7					3		2		1	1	22			1	2	1			2	
New incidental																																											
Sought, NOT found																																											
NOT sought or found	123	10	2	24	9					2				8	20					8	6			7					2		9	7	2	2	1	2		2					
Total	228	25	8	32	15	1	1	2		2	2	2		9	22		3	2	2	8	8	8	7	7				3	2	2	9	8	3	24	1	2	1	4	1			2	

Newly Marked Mounds that will be checked every 5th year.

	Sites	1	2	3	4	5	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
Sought and found	13	2	1				4					1				1	1		2																		2						
New incidental																																											
Sought, NOT found	1																																				1						
NOT sought or found	5	1			1							1																							2								
Total	19	3	1		1		4					1				1	1		2																2		3						

Mounds that will be omitted from annual lists (erroneous records, and mounds well outside grid boundaries).

	Sites	1	2	3	4	5	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
Sought and found	1																																									1	
New incidental																																											
Sought, NOT found	1																							1																			
NOT sought or found																																											
Total	2																							1																		1	

	Sites	1	2	3	4	5	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
Grand Total	1399	80	58	103	111	16	62	19	16	2	17	28	39	26	107	46	31	28	24	62	41	19	70	18	8	30	20	25	11	10	19	19	8	84	13	9	56	24	12	0	11	13	4