Malleefowl Monitoring in Victoria: 2018/19

Contents

Appendices

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; another great result! (More detail is shown in Appendix A.1). The VMRG visited 1369 Malleefowl mounds during the 2018 (2018/19) breeding season (Table 1) including 4 newly listed mounds.

A total of 10 regular mounds appear to have been neither sought nor found during the 2018 season (Table 1) and these were scattered through 8 sites. There were also 5 regular mounds that were searched for but could not be found although they were found in previous years.

Overall, we managed to find 98.9% of the mounds that we set out to monitor (excluding newly added mounds, but including optional '5 year' mounds that were monitored. The next time optional mounds will be mandatory will be in 2020.

Table 1. Effectiveness of the monitoring effort. 'Optional old' mounds are those that were categorised as optional (5yr) before the 2017 season, whereas 'Optional new' are mounds that were added to the optional list last season. Omitted mounds are those removed from monitoring lists last season.

	Total	Regular	Optional old	Optional new	Omitted
Sought and found	1369	1187	159	19	4
New incidental	4	4	0	0	0
Sought, NOT found	7	5	2	0	0
NOT sought or found	109	10	99	0	0
Total	1489	1206	260	19	4

Last season (2017), 19 mounds that were monitored as regular mounds were reviewed and downgraded to optional (5 year mounds) for subsequent seasons; these mounds show up in the tables as new optional mounds this season. This brings the number of mounds on the optional list to 279, or 19% of our total monitoring target.

64% of the optional mounds were monitored this season (178 of 279), mostly in an abbreviated way by simply taking a photo and not recording mound details. 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 1369 mounds that were monitored in Victoria in 2018/19, 99 were active compared with 148 last season (2017) and 150 in the season before that (2016; these totals include mounds outside strict site boundaries). These numbers are much lower than the record of 218 set in 2012.

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. This decline is partly due to wildfires that thoroughly burnt Bronzewing v04, which typically had 12-15 active mounds, in 2014. However, the low breeding numbers in Figure 1 weren't simply due to v04 being burnt: when data from this site are excluded (Figure 1) 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 30 years; breeding numbers were lower only in the 2002 drought.

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 show a similar pattern of very low breeding numbers in 2018 and indeed the past 6 six seasons. Figure 3 shows the same data broken down into three regions (Eastern big Desert, North West and North East). Breeding numbers were down in all three regions. There are worrying signs of continuing decline in the North East and breeding numbers continue to be well below historical averages in the Eastern Big Desert.

Elsewhere, there is not enough data to plot regional trends; histograms showing individual showing site trends are available on the NMMD. In the 8 main sites in and around the Little Desert (v24, v25, v28, v36, v38, v39, v42 and v43) breeding numbers were mostly similar to previous years, except at Tooan v38 where, surprisingly, the number of active mounds doubled from 4 last season to 8 in 2018. At the four Wychitella sites (v29, v31, v32, v33) breeding was recorded only in the Korong Vale (v33) site where 1 mound was active (3 last season).

Mali Dunes (v41) south of the Big Desert also recorded a decline with only 5 active mounds compared to 8 in the previous three seasons.

- *Comparing 2018 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 2018 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 (over 1,200 counts of breeding numbers at sites) without bias due to missing data in previous years.

Figure 4a shows that on a site by site basis, breeding numbers across Victoria in the 2018 season was nearly the lowest on record. 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

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monitored. 2018 was the 2nd lowest breeding result of the 28 seasons on record; only the 2002 drought had lower breeding numbers This is the sixth season in a row where results have been much lower than the long-term average.
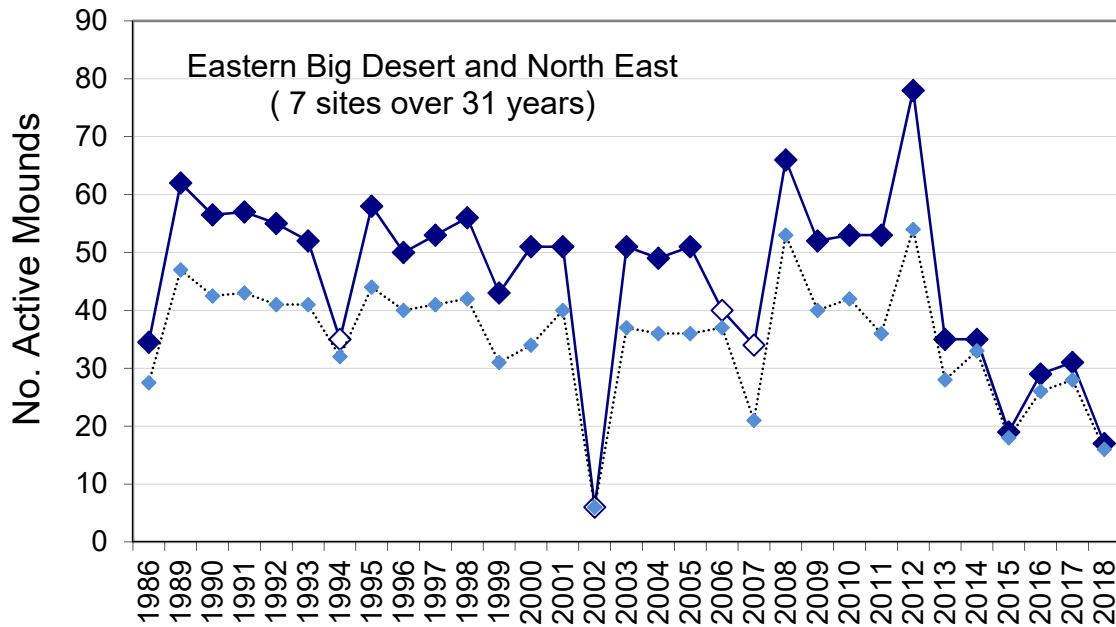

Figure 1. Trends in Malleefowl breeding numbers at 7 of the longest monitored sites over the past 31 years (upper graph), and at 6 of these sites excluding v04 (lower graph). 1994, 2002, 2006 and 2007 were major drought years (white points). Data comprise mounds in set areas across years in sites v01, v02, v03, v04, v07, v20 and v23.
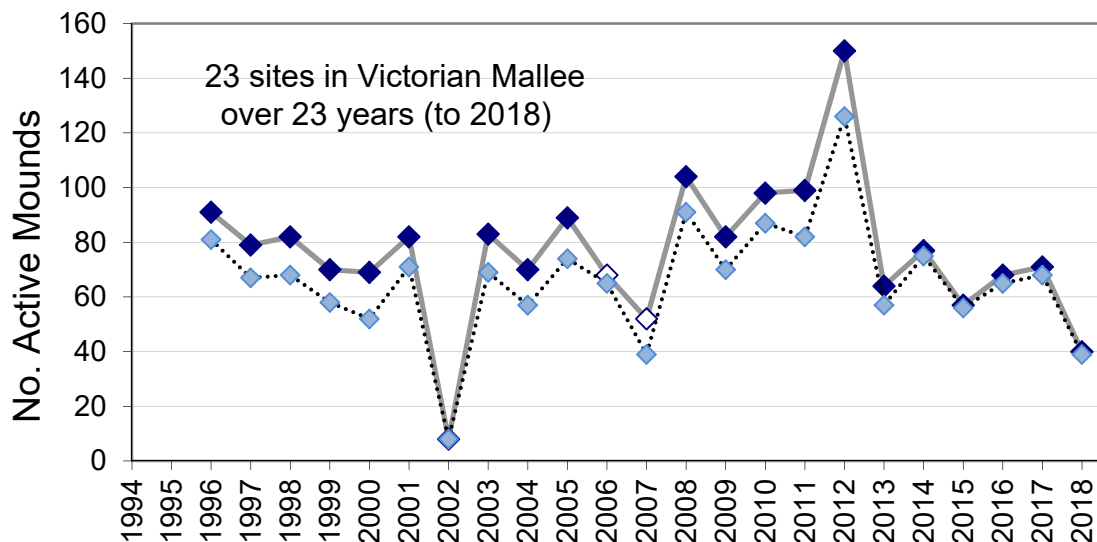
Figure 2. Trends in Malleefowl breeding numbers at 23 sites over the past 22 years (upper graph), and at 22 of these sites excluding v04 (lower graph). 1994, 2002, 2006 and 2007 were major drought years (white points). Data excludes mounds outside site boundaries. See figure 4 for regional breakdown.
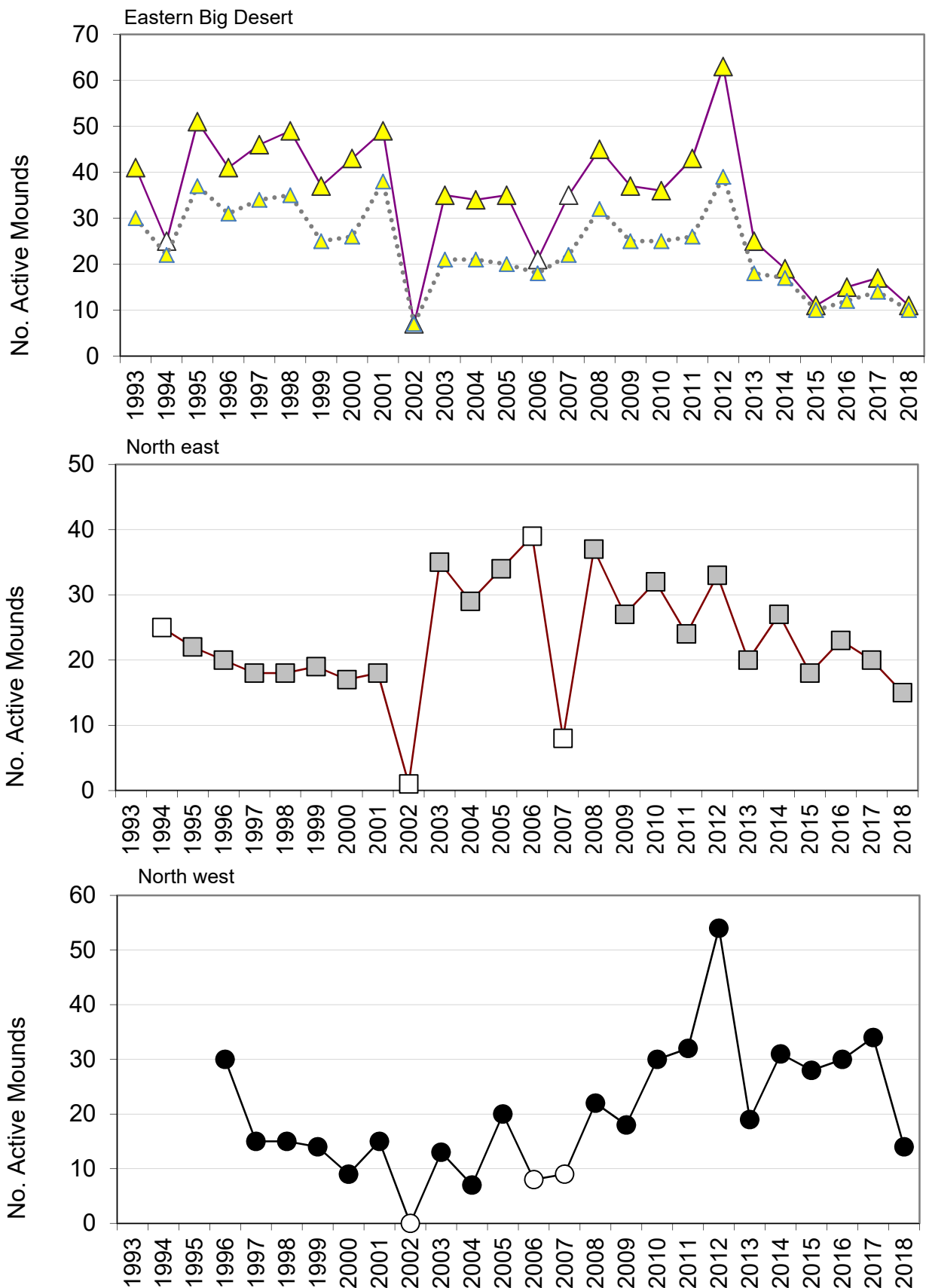
Figure 3. Trends in Malleefowl breeding numbers at 22 sites over the past 23-26 years shown by region. Eastern Big Desert (triangles) comprise 6 sites over 26 years (upper graph), and 5 sites excluding v04 (lower graph), North East comprise 4 sites over 25 years (shaded squares), and North West comprises 12 sites over 23 years (solid circles). 1994, 2002, 2006 and 2007 were major drought years in many areas. Data excludes mounds outside site boundaries.
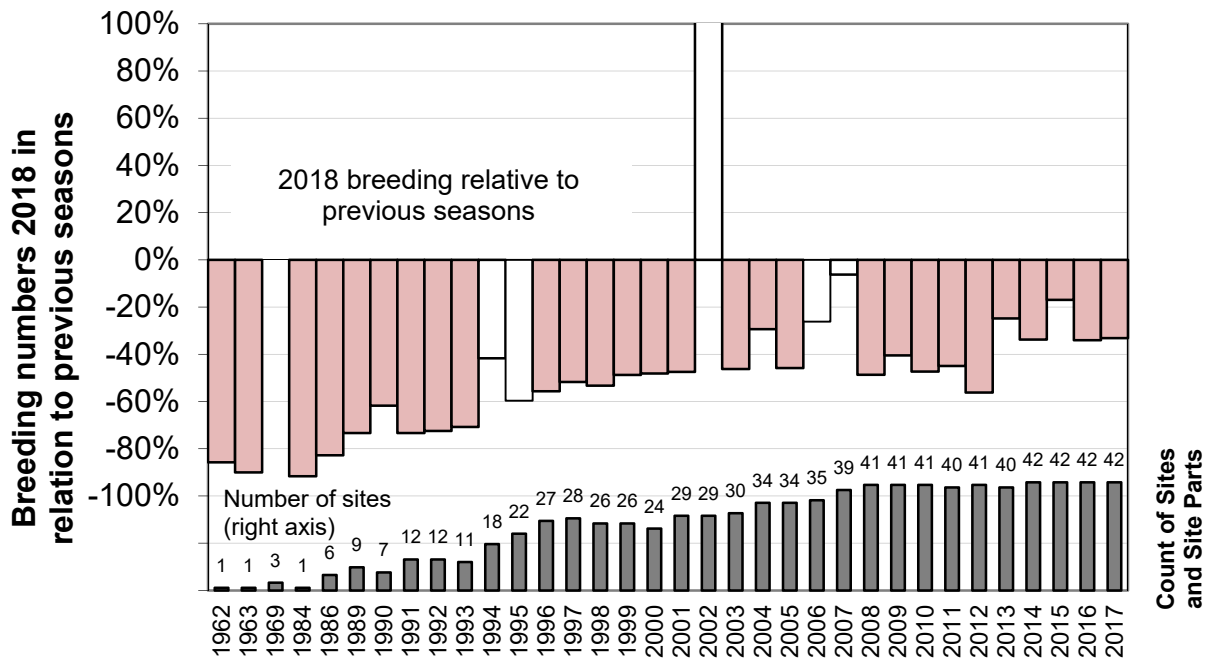
Figure 4. a) Breeding numbers of Malleefowl in the 2018 season compared with all previous seasons (upper chart) and the number of sites involved (lower chart). The zero line in the chart indicates no difference, values above zero indicate that breeding numbers in 2018 were above those in the past, and values below zero indicate a decline. For example, breeding numbers in 2018 were 56% less than those in 2012 and 33% less than those in 2017. Drought years are indicated by unfilled columns.

The bottom chart shows the number of sites involved and reflects the reliability of the comparisons: for example, the comparison with 2012 is based on 41 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.

Malleefowl Breedometer
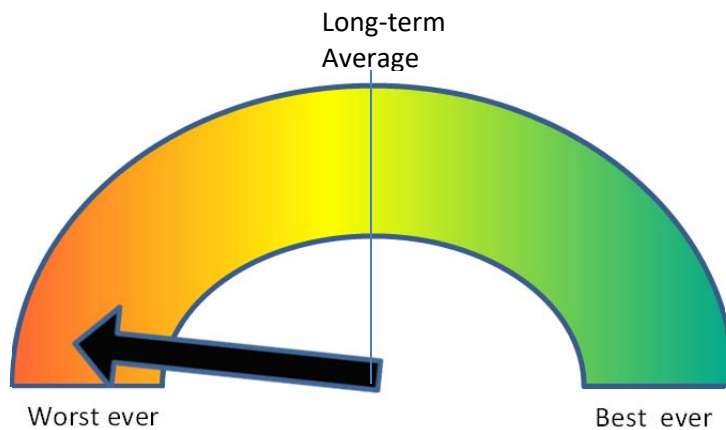
2nd worst in 28 years

Figure 4. b) Malleefowl Breedometer summarising Figure 5a for the seasons in which there were at least 10 sites in common with 2018 data. The 2018 season was the 2nd worst result of the last 28 seasons.

- *Rainfall profiles in 2018*

2018 was characterised by very dry conditions in the Victorian mallee: yearly rainfall was down 50%, 41% and 25% for Mildura, Ouyen and Horsham respectively, with December being the only month with greater than average falls. The start of the year was exceptionally dry, and although average rainfall was recorded in May and June, dry conditions returned in July and August when Malleefowl were completing their mounds, particularly in the north where Mildura received only one third, and Ouyen one half, of their median rainfall. Further south, Horsham experienced a more typical late autumn and winter rainfall, although conditions became dry in September and October. Whether these patterns explain the poor breeding results over the past few years is unclear, but is being examined in the national trend analysis currently underway.
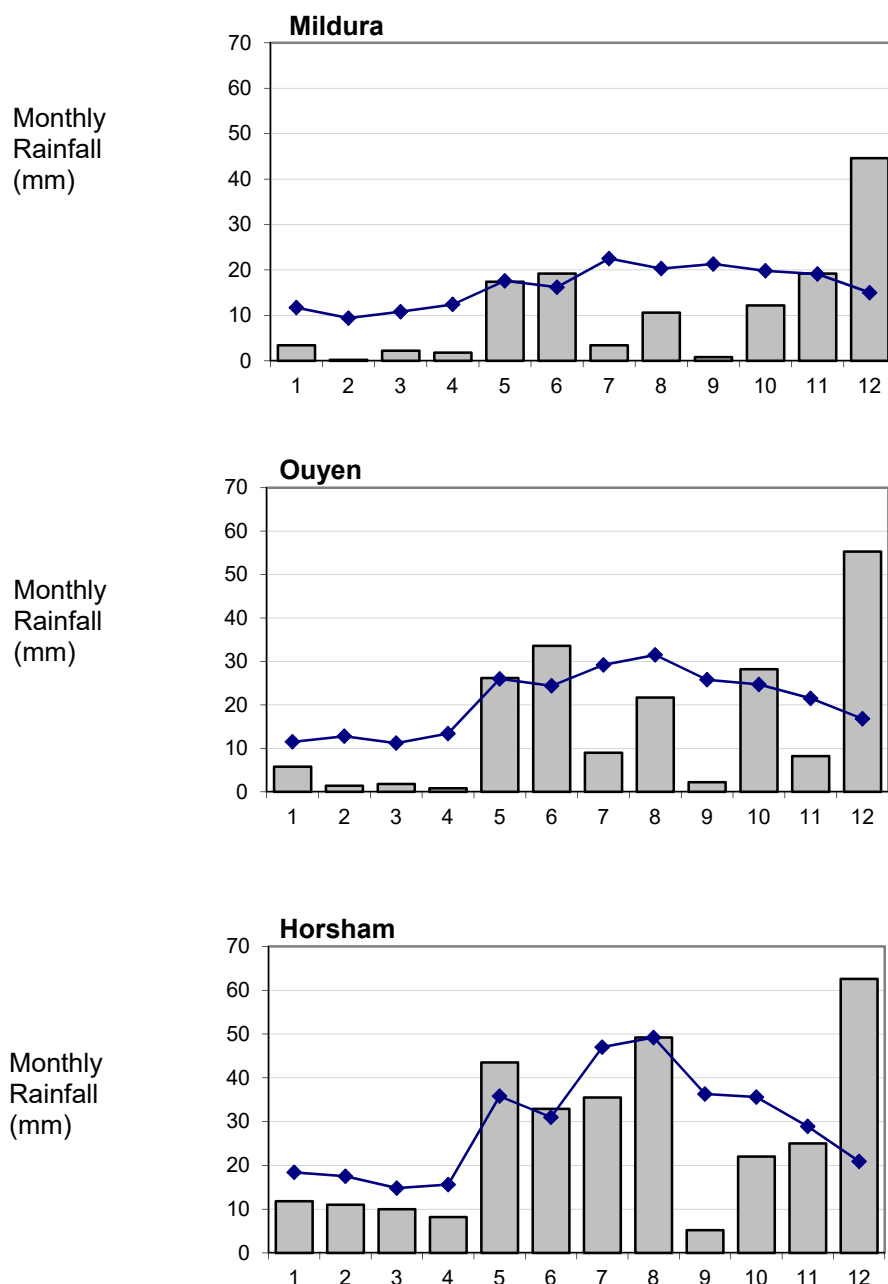

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Figure 5. Rainfall at Mildura, Ouyen and Horsham in 2018 (bars) and median rainfall since early 1900s (line).   (Data from the Bureau of Meteorology website).

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 everyone used the Samsung smartphones successfully (the LG phones have been retired).

4. Lerp

Lerp abundance on mounds was the second highest recorded since we started noting lerp on mounds in 2006 (Figure 6): 12% of mounds had lerp on them in 2018 when mounds were monitored (mostly October-December). Lerp was most abundant in the Sunset Country sites where 33% of mounds showed some lerp, and 17% of mounds showed abundance (Figure 7), but numbers were much lower in other regions. Within each of these regions, lerp abundance was patchy, for instance of the 8 sites in the Sunset, 5 had no lerp whereas at three sites (v13, v16 and v18) lerp was recorded on two thirds of mounds.
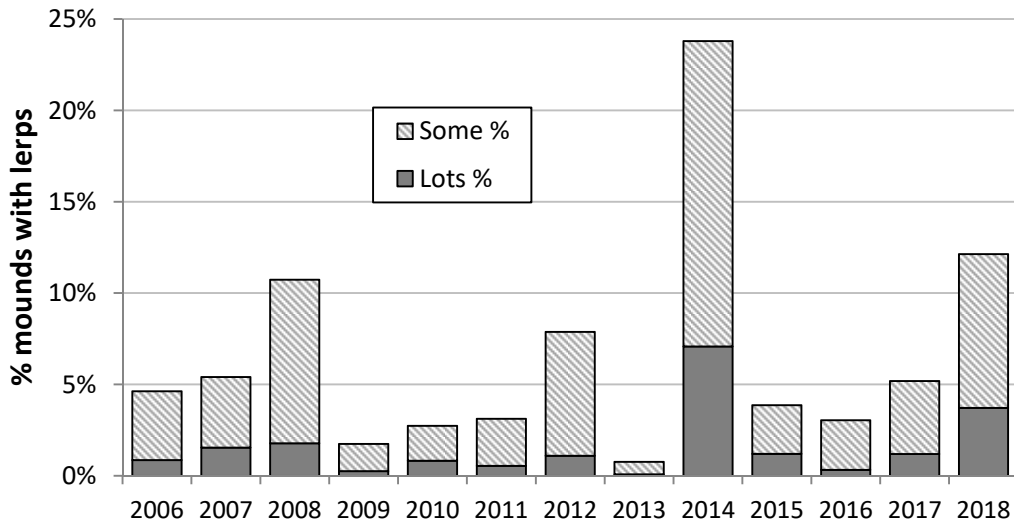
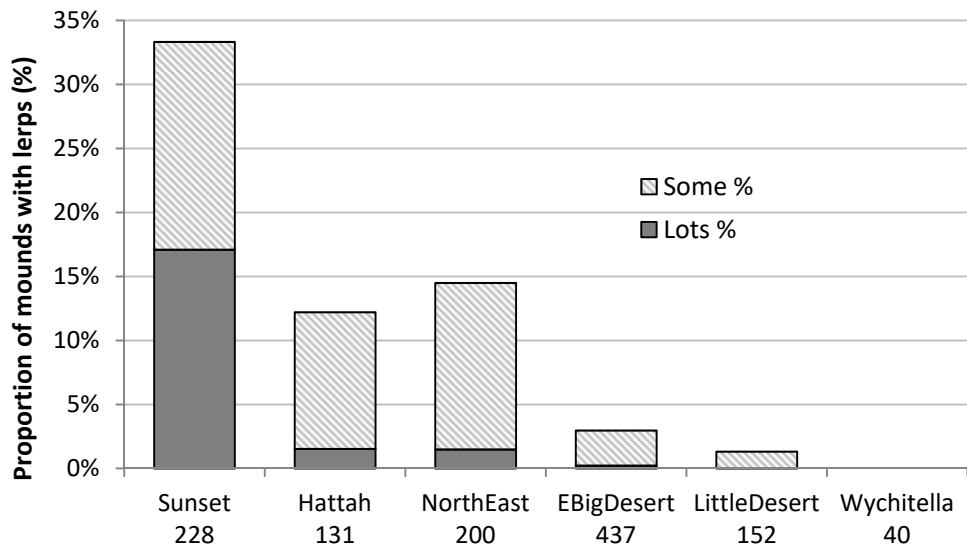**Figure 6.** Proportion of mounds on which lerp were detected in each season since 2006.

Figure 7. Regional breakdown of lerp occurrence on mounds in the 2018 season.

5. Fox scats

Fox scats were collected at 452 mounds in 2018 and weighed a total of 6.5 kg, a result that is higher than last season (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 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 but now appears to be increasing again.
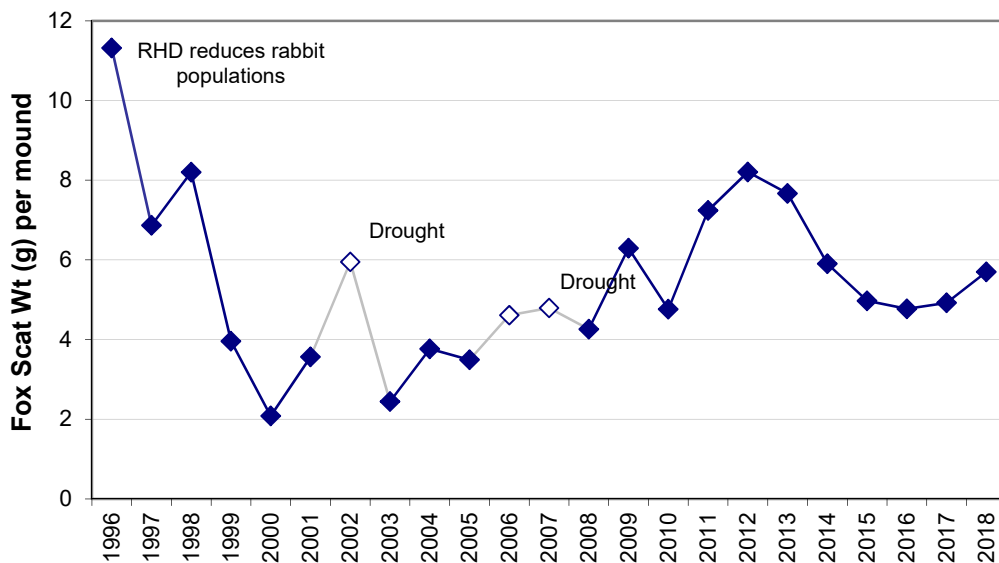

Figure 8. Trends in the average fox scat weight per monitored mound at 20 sites over 23 years. No attempt has been made to control for biases due to variations in the proportion of active mounds (more likely to be marked with fox scats) or changes in the proportion of very old and inconspicuous mounds.

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 2018 and the previous year (italics). Malleefowl scats and feathers were also collected in 2018 but are not tabulated here.

Grid	Name		Fox Scats 2018 Wt (g)	2018 Count	2017 Wt (g)	2017 Count
v01	Dattuck		135	14	172	17
v02	Torpeys	+	374	18	28	4
v03	Wathe SW	+	620	46	392	24
v04	Bronzewing	+	849	59	518	39
v05	Colignan	+	181	12	70	6
v07	Annuello	+	84	7	59	2
v08	Powerline	+	79	8	66	5
v09	Mt Hattah	-	32	3	46	4
v11	Mopoke	-	33	5	76	6
v12	Pheeneys	+	57	6	38	3
v13	Bambill				263	19
v14	Menzies	+	352	19	166	10
v15	Wandown	-	372	21	472	31
v16	South Bore		123	20	128	13
v17	OneTreePlain	+	23	2	3	1
v18	WashingMachine				195	11
v19	Underbool	-	9	2	30	6
v20	Lowan	+	215	20	178	7
v21	Dumosa	+	236	19	139	10
v22	Dennying	+	120	4	59	4
v23	Moonah		1022	59	1364	62
v24	Kiata	+	100	7	49	3
v25	LDL Sanctuary		128	8		
v26	Hattah Tracks	+	347	19	102	10
v27	O'Brees	+	130	7	62	3
v28	Nurcoung	-	96	6	193	9
v29	Wedderburn		20	3		
v30	Hattah South				41	3
v31	Skinners Flat		12	3	14	2
v32	Wychitella		27	5	26	5
v33	Korong Vale	+	7	1		
v34	Paradise		456	21		
v35	Broken Bucket		89	7		
v36	Boughtons WH				25	2
v37	Wisemans	+	131	10	5	1
v38	Tooan	-	48	5	70	8
v39	Oldfields				25	2
v40	Iluka		5	2		
v41	Mali Dunes	+	27	3	11	1
v42	Cooack		8	1	40	3
			6547	452	5125	336

6. Participation and in-kind contribution

This year, VMRG members and non-members participated in the monitoring and totalled about 1284 monitoring hours in the field (assuming a rate of 3 mounds per hour). In addition, VMRG members totalled at least 762 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 $71,336 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 2018 include committee meetings, training weekends or reporting back meetings, which collectively involved well over 160 unpaid hours. Together, these activities totalled about 400 hours and were worth at least another $13,944.

Thus, we conservatively estimate the in-kind value of the VMRG activities in 2018/19 to be at least $85,280

*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

The VMRG collects excellent data and makes 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 very low – one of the worst results in 28 years – probably reflecting the very dry conditions in winter. Even more worrying, this was the sixth season in a row in which monitoring results were below the long-term averages. Fox numbers do not appear to be especially high compared with past data, but may be increasing. We, and no doubt the mallee farmers, hope for good winter rains in 2019 and that the monitoring by the VMRG will show further improvements in Malleefowl breeding numbers.

This year we had great assistance with monitoring from Bendigo BRITAFE at Tooan, and from University of Melbourne students (Alys Young, Jessica Keem and friends) at the Wedderburn Sites.

- *Update on the motion-sensitive camera project*

Our 48 cameras traps (with solar panels, batteries and stakes) installed at six sites in 2015 (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 photograph animals (and, alas, moving branches!) day and night, 365 days a year. They provide important insights into the trends in various animals that might affect Malleefowl numbers such as foxes, cats, goats, pigs, rabbits and kangaroos.

In the past year VMRG members processed the photos collected last year during the 2017 monitoring and in the field swapped the memory cards at all cameras during monitoring. Overall, things went smoothly, however several cameras have failed and we have not had the time or resources to fix them. We hope to repair or replace damaged camera traps at all sites before the next monitoring season and Mick Webster and Tony Murnane have offered to help.

The photo processing by VMRG members went very well and the 13 people who volunteered their services did a really great job. About 70,000 photos were sorted with several people sorting more than one set of 10,000 photos. To ensure accuracy, our new process involves two independent people inspecting each photo; where both people don't agree on the contents of a photo a third independent person is consulted for an opinion. The process is working well, as those of you that went to the Malleefowl Forum in Mildura would have heard, and I am preparing a paper for the Forum proceedings on the findings thus far. We are currently preparing the 2018 photos for sorting so if you are interested, please let us know.

The VMRG have commissioned Becky Alcorn to develop the NMMD to store camera trap data, facilitate the processing and report on the results (funds provided by the Iluka Malleefowl management Committee). These developments are still underway and when completed will provide a more streamlined process for storing and reporting on the findings.

Thank you to the members who offered their services for this project! Measuring these trends is vital for understanding the threats to Malleefowl and also for measuring the effectiveness of management. These are important issues, and our methods are especially relevant to the AM project across the continent that also uses camera-traps.

If you think you might like to try your hand at sorting photos this year, please contact us. It's easy and interesting, and it's very important to understanding how to best conserve Malleefowl.

- *Update on LiDAR and AM project*

Belinda Cant (Department of Environment, Land, Water and Planning) organised another LiDAR scan of parts of the eastern Little Desert in 2018 (parts not scanned in 2016), and VMRG members assisted by taking on the huge effort of ground-truthing hundreds of potential mounds that were detected.   Iestyn Hosking (VMRG) once again led this ground-truthing project. 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 are learning a great deal about the distribution of Malleefowl in the Little Desert. The last series of scans added a number of new mounds in our existing monitoring sites in 2017.

The new Cooack v42 site (incorporating the old "Nurcoung Farmers" mounds and many mounds found by Lidar), has been paired with Nurcoung v28 and Tooan v38, and this cluster is now part of the National Malleefowl Adaptive Management Predator Experiment. Victoria's first AM cluster! Abigail Watkins (Parks Victoria) has already installed camera-traps at these sites and baiting is underway at Cooack. Tooan will likely be baited soon as well, but Nurcoung will be left unbaited as an experimental control.

While the Wimmera has been first in Victoria to join the AM program, the Mallee CMA is not far behind. New camera-traps have been installed at Annuello v07 and Wandown v15, LiDAR data have been collected, and baiting has been begun in Annuello, while Wandown is being left unbaited as an experimental control. Given our long and detailed monitoring of these sites and the good numbers of Malleefowl, it will be fascinating to see the effect of baiting on the Malleefowl population. We'll also be able to gauge an effectiveness of the baiting programs on foxes at both the Wimmera and Mallee sites, as well as on cats and a range of other animals. The VMRG will be making an enormous contribution to the project in both the Wimmera and Mallee by continuing to monitor Malleefowl, downloading the camera-traps, and sorting through the photos. These important projects would not be viable without our citizen scientist volunteers!

Darren Southwell, who runs the National Malleefowl Adaptive Management Program at University of Melbourne, has been busy analysing the national monitoring data to better understand Malleefowl trends as well as analysing the first data from established predator experiment sites (mostly in WA and SA at this stage). His MSc student Alys Young, who many will remember from her talk at the Forum, is busy with her project. Alys is evaluating the usefulness of satellite imagery that detects plant growth for understanding Malleefowl trends. Her initial investigation suggests it may be a better indicator of Malleefowl breeding numbers than winter rainfall, and if so it will be a great boon to our understanding of Malleefowl trends.

Jessica Keem is a new MSc student supervised by Darren and will be working on fox density estimation as part of the Malleefowl AM program, hopefully at the predator experiment sites in both the Mallee and Wimmera. Jessica's project will involve developing ways to improve fox baiting, particularly at Annuello, Cooack and Tooan, so it's also very important for Malleefowl conservation.

Appendix A 1. 2018/19 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	1187	48	47	73	90	15	55	17	16		14	26	39	20	86	45	27	26	20	50	34	10	65	10	7	28	18	28	10	6	10	10	7	64	10	15	49	23	9	2	12	29	17
New incidental	4						1				1															1															1		
Sought, NOT found	5						1											1																				1	1			1	
NOT sought or found	10						1				1				1					1						2				1		1								2			
Total	1206	48	47	73	90	15	58	17	16		16	26	39	20	87	45	27	27	20	51	34	10	65	10	7	31	18	28	10	7	10	11	7	64	10	15	49	24	10	4	13	30	17

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	159	16	8	30	16	1	4	2		3	2	3		9	4	1	5	1	1	7	8	5	1	1						3			3	14			4	3	2		2	
New incidental																																										
Sought, NOT found	2			1																																		1					
NOT sought or found	99	13	1		1		4								17				2	3	10	1		1	7	1				4	2			9	8		9	3	1		1		1
Total	260	29	9	31	17	1	8	2		3	2	3		9	21	1	5	1	3	10	18	6	1	2	7	1				7	2		3	23	8		13	7	3		1	2	1

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	19	3	1	1	2					1				1						1						1	2	1									1	4					
New incidental																																										
Sought, NOT found																																										
NOT sought or found																																										
Total	19	3	1	1	2					1				1						1						1	2	1									1	4					

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	4																											4															
New incidental																																										
Sought, NOT found																																										
NOT sought or found																																										
Total	4																											4															

	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	1489	80	57	105	109	16	66	19	16	4	18	29	39	30	108	46	32	29	24	63	42	18	71	18	9	32	20	37	12	10	19	19	10	87	13	16	55	32	12	5	13	32	17

01 Dattuck　　　　　　　　　　　　　　　　　Eastern Big Desert
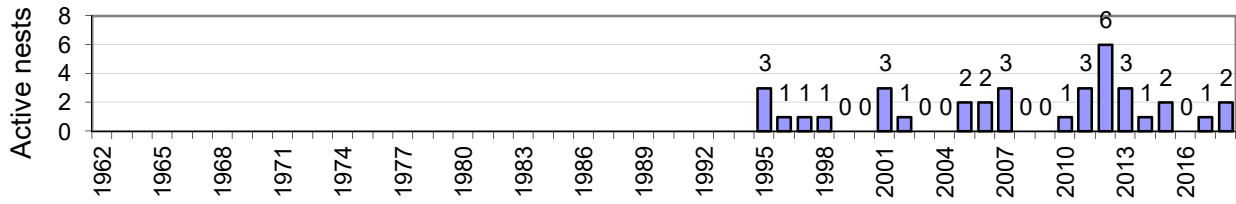
02 Torpey's　　　　　　　　　　　　　　　　　Eastern Big Desert
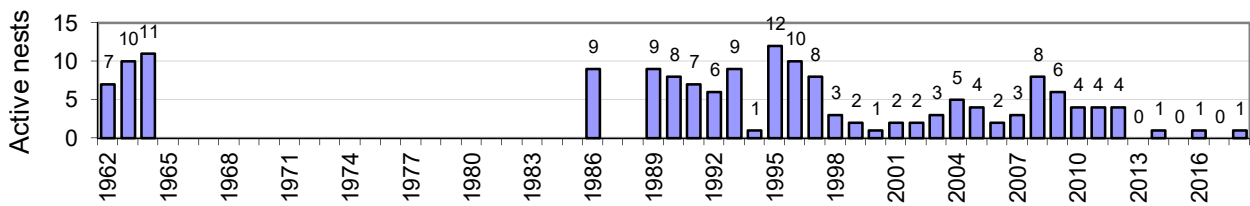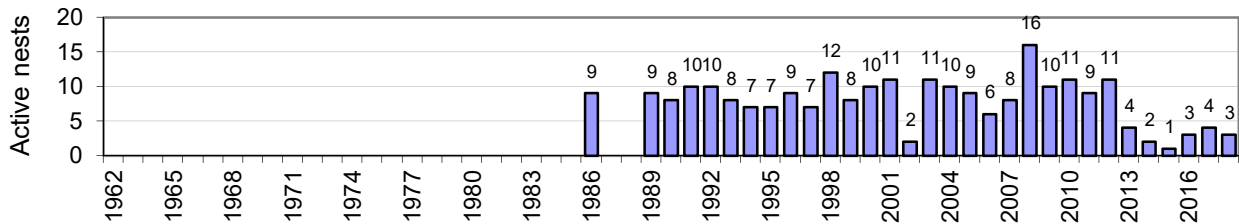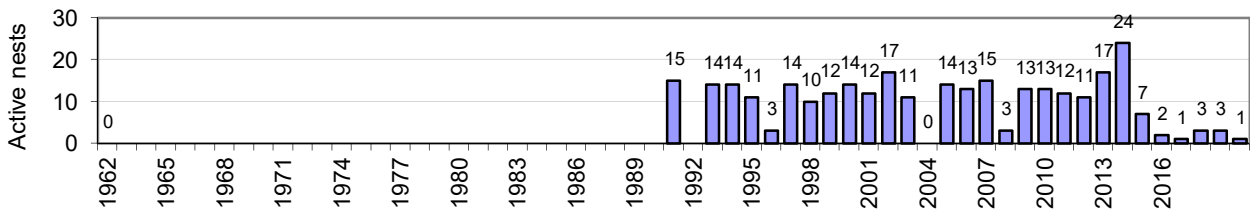

03 Wathe SW　　　　　　　　　　　　　　　　　Eastern Big Desert
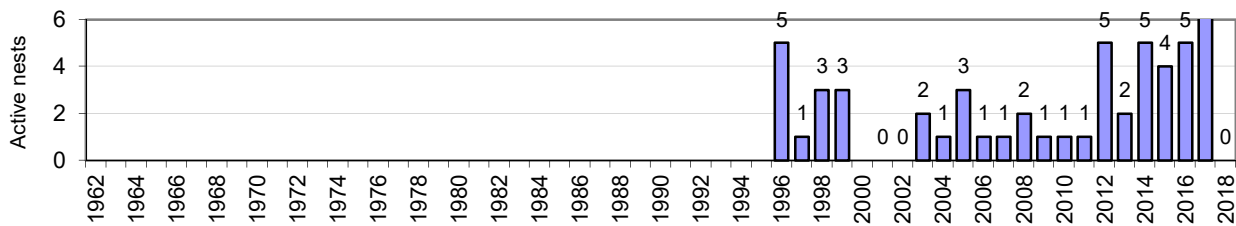

04 Bronzewing　　　　　　　　　　　　　　　　Eastern Big Desert

05 Colignan　　　　　　　　　　　　　　　　　North West

Season

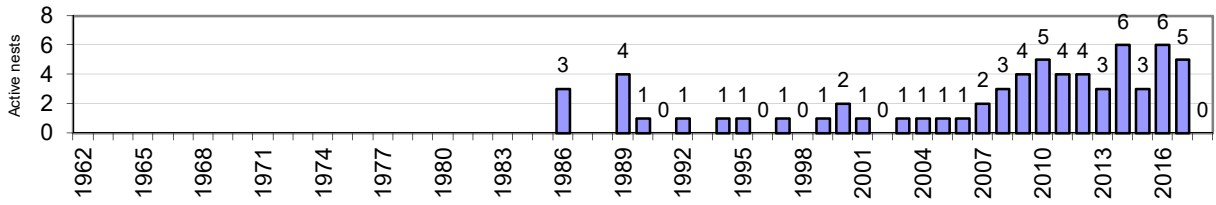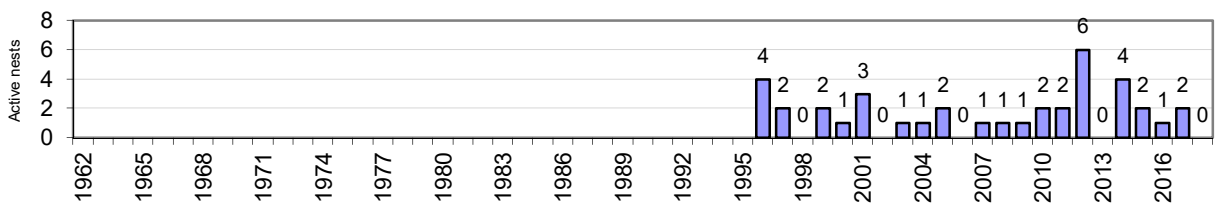## 07 Annuello

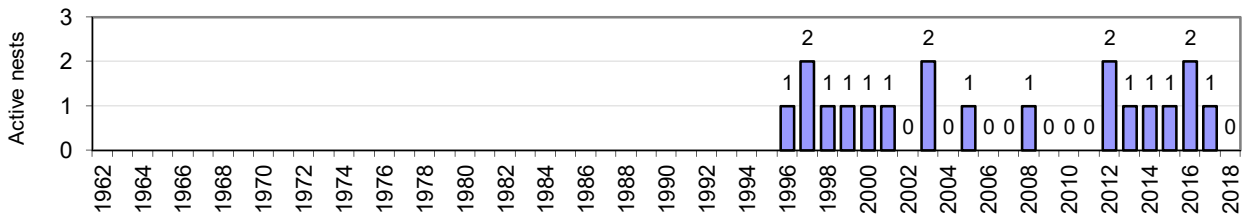Note: active mounds in 07 part C not shown

North East

08 Powerline

North West

09 Mt Hattah

North West

10 1 Tree BNT

North West
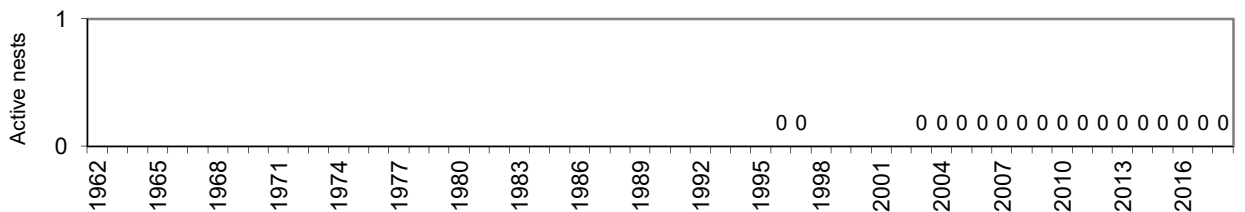
11 Mopoke

North West
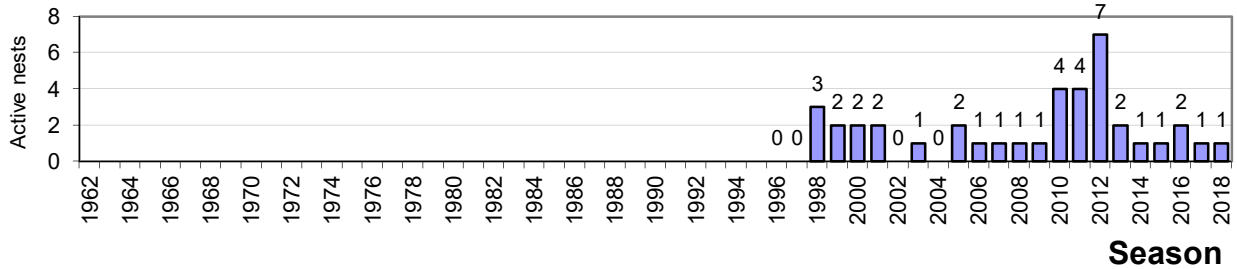
Season

12 Pheeneys　　　　　　　　　　　　　　　　North West
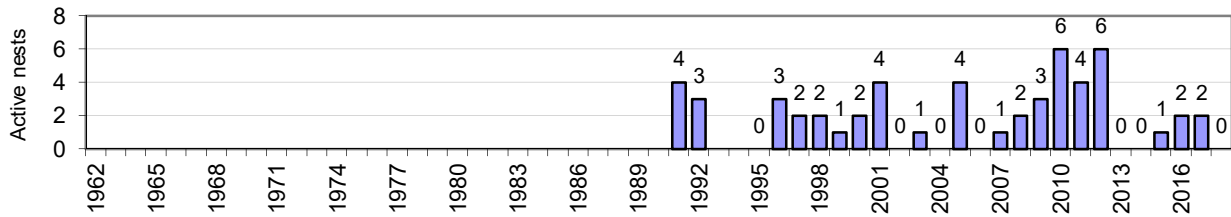
13 Bambill　　　　　　　　　　　　　　　　North West
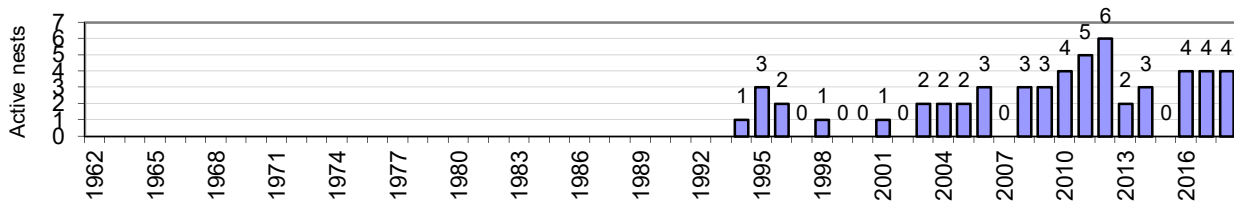
14 Menzies　　　　　　　　　　　　　　　　North East
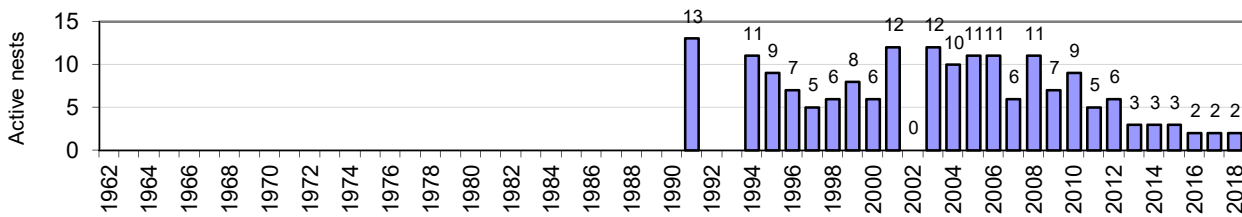
15 Wandown Part A　　　　　　　　　　　　　　North East
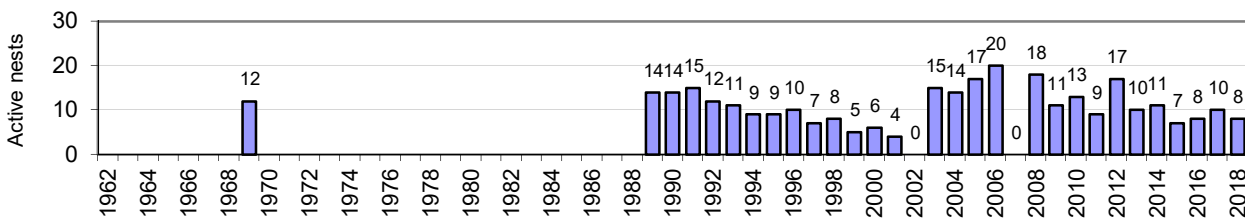
15 Wandown Part B　　　　　　　　　　　　　　North East
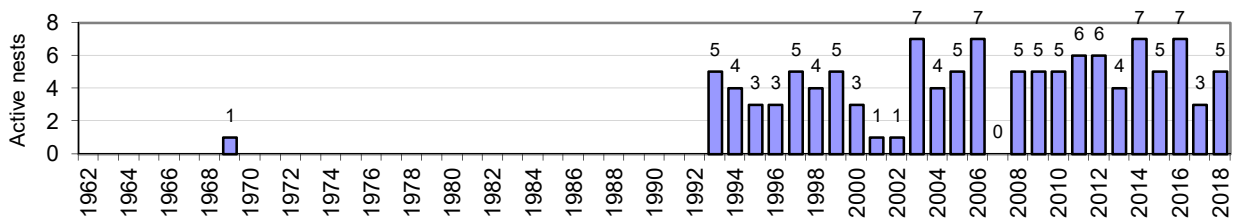
Season

15 Wandown Part C   Note: active mounds in 15 part D not shown   North East
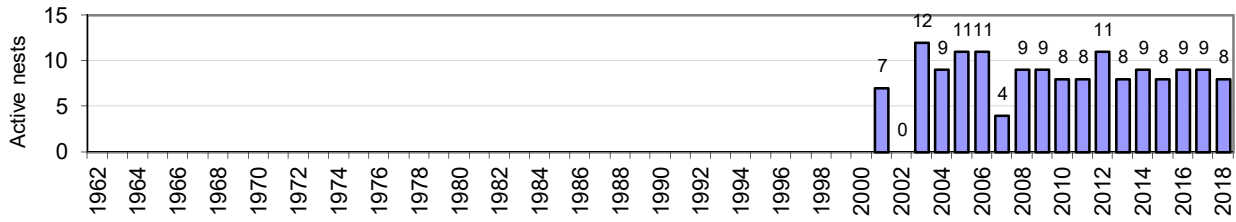
16 South Bore   North West
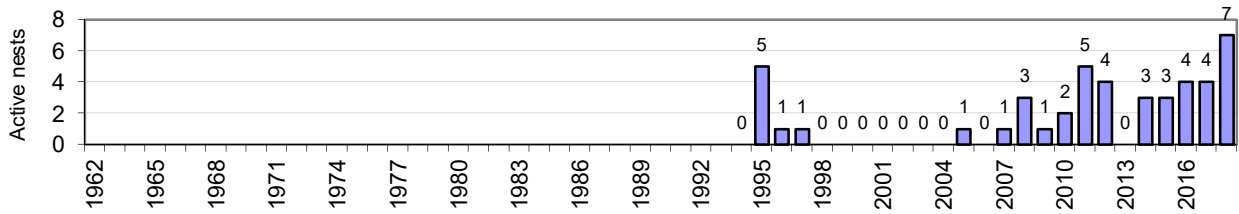
17 One Tree Plain   North West
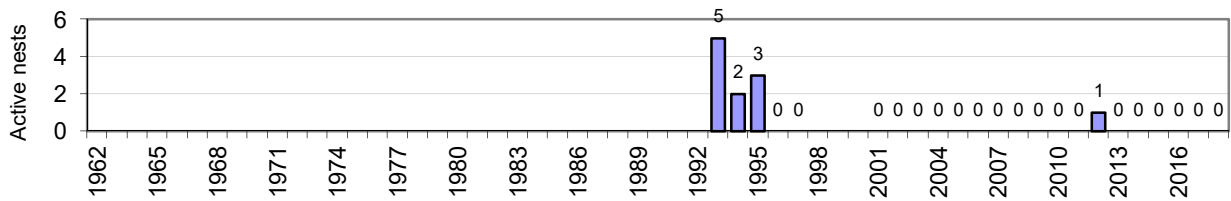
18 Washing Machine   North West
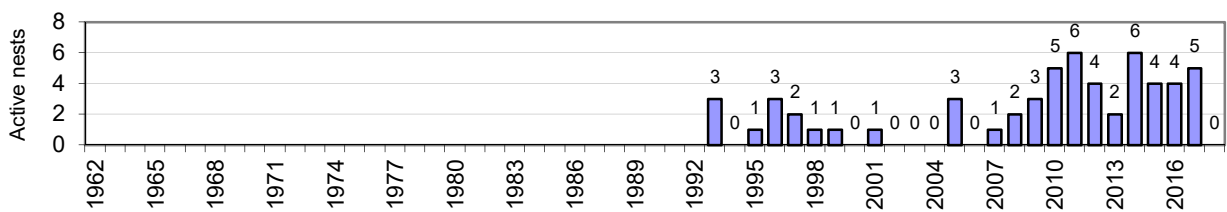
19 Cowangie/Underbool   North West
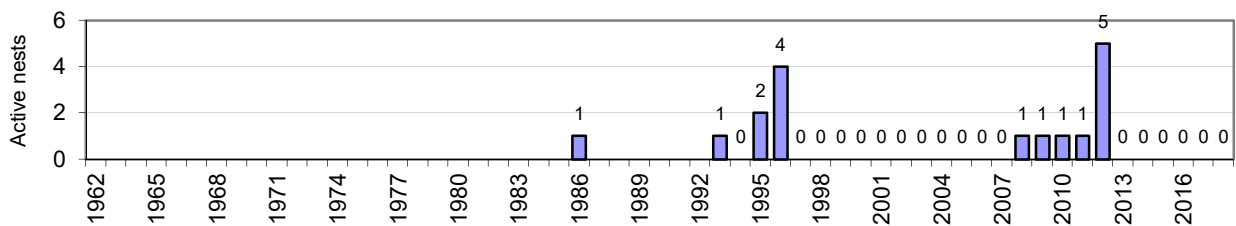
Season

20 Lowan   Eastern Big Desert
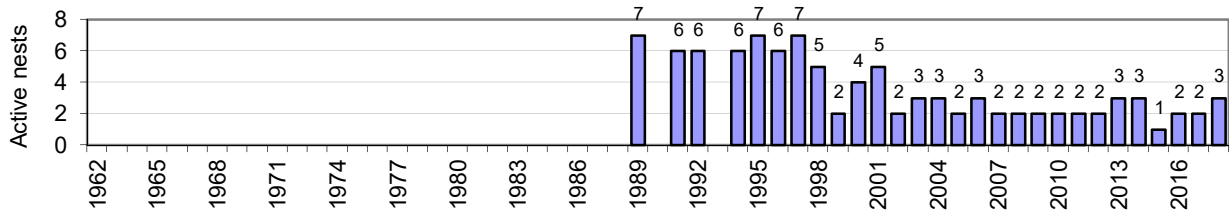
21 Dumosa   North West
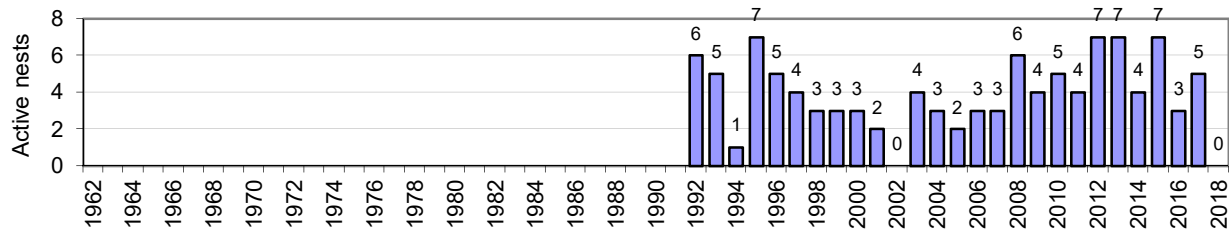
22 Denning   North West
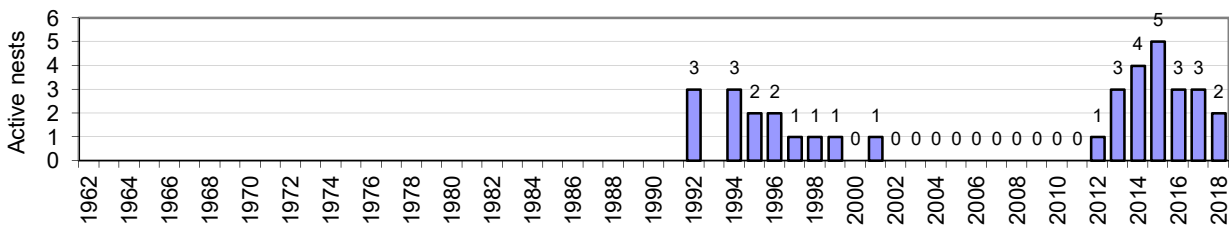
23 Moonah   Eastern Big Desert
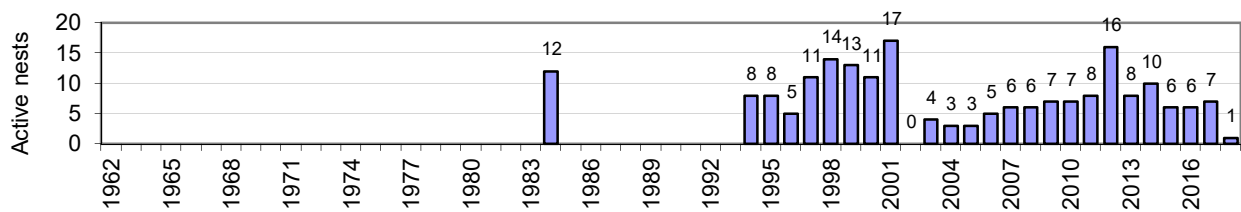
24 Kiata   North East
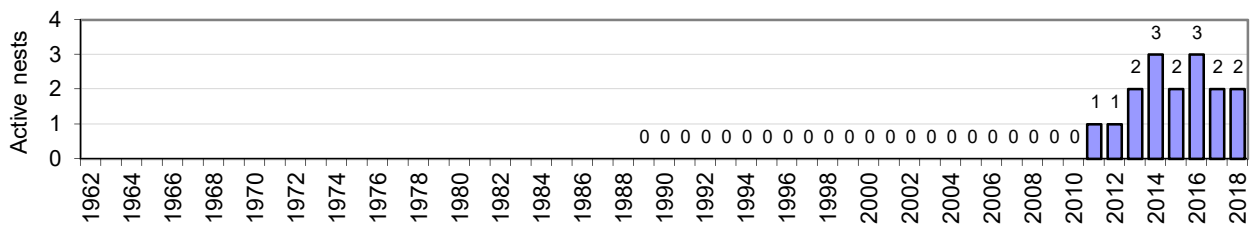
Season

26 Hattah Tracks   North West
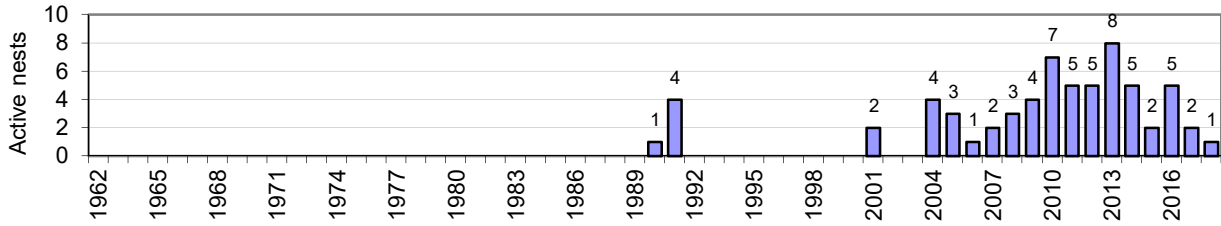
27 O'Brees   North East
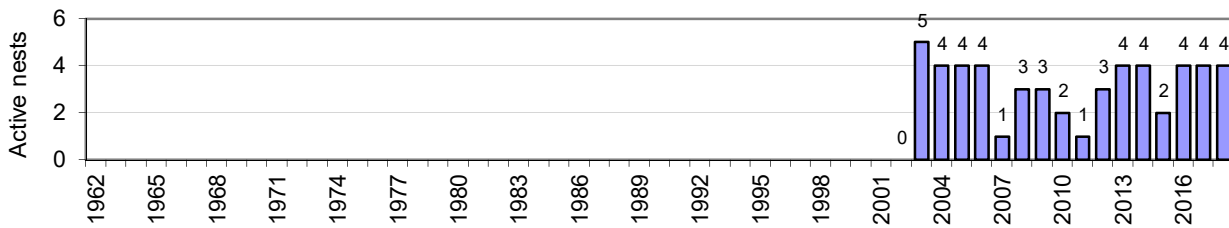
28 Nurcoung   Little Desert
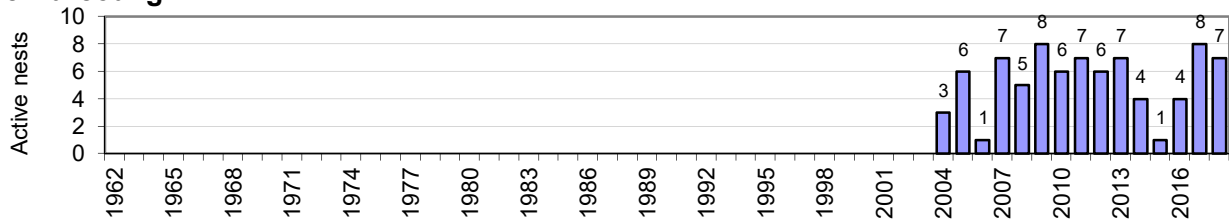
29 Wedderburn   Wychitella NCR
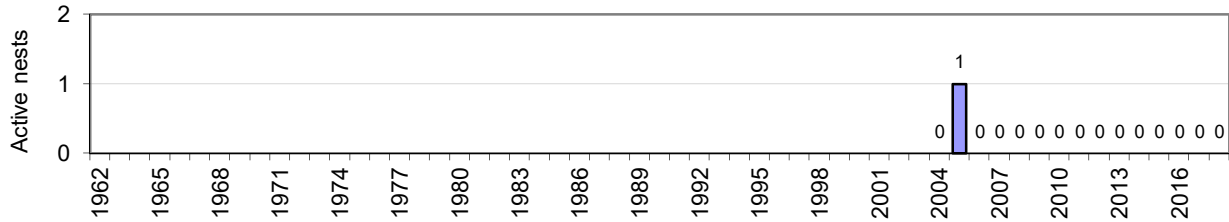
30 Hattah South   North West
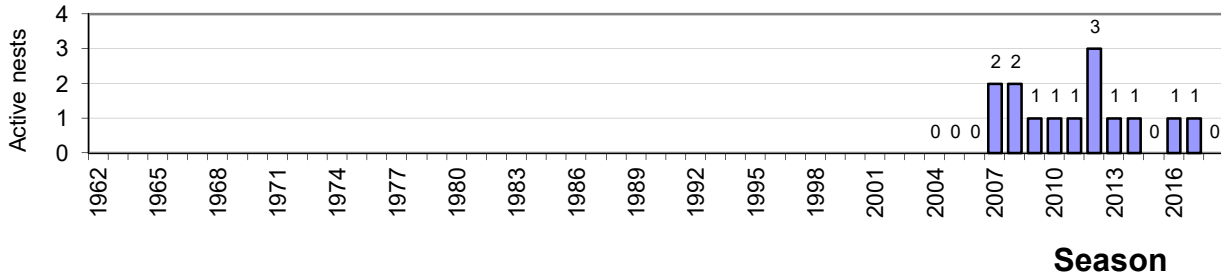
Season

31 Skinners Flat
Wychitella NCR
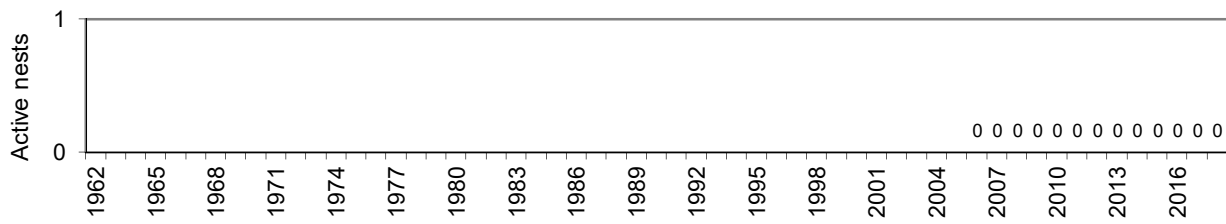
32 Wychitella
Wychitella NCR
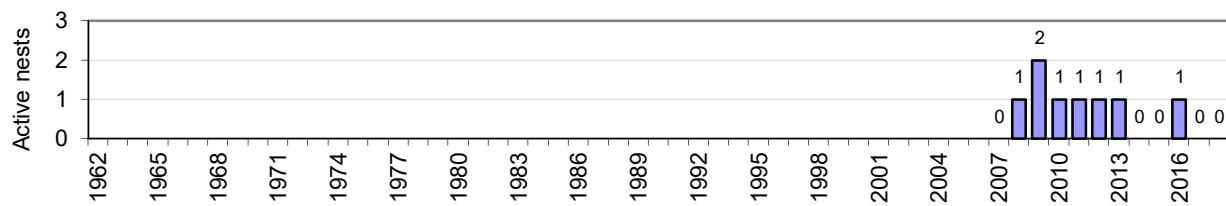
33 Korong Vale
Wychitella NCR
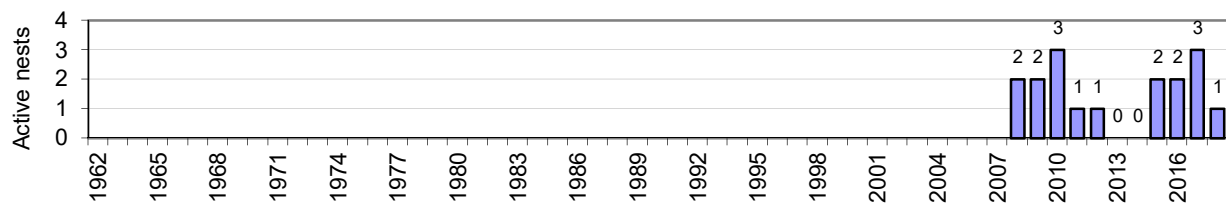
34 Paradise
Eastern Big Desert
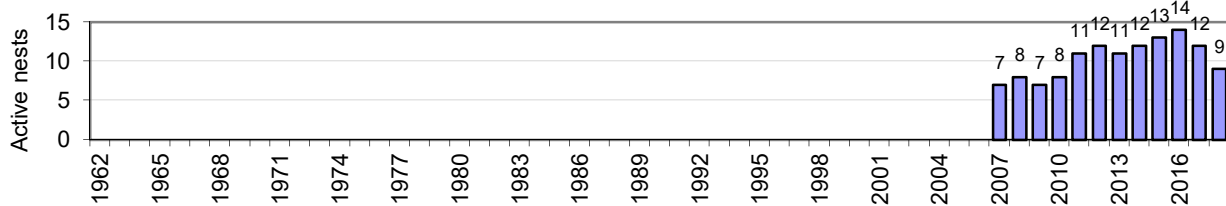
35 Broken Bucket
Western Big Desert
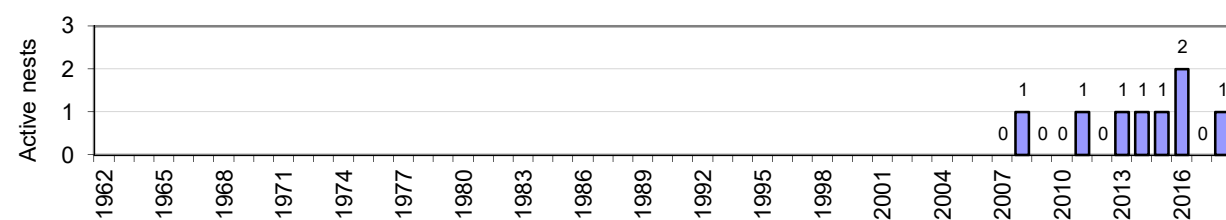
Season

Season

36 Boughtons WH

Little Desert
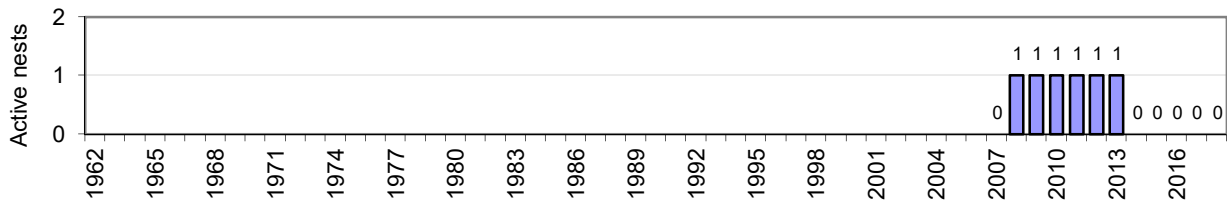
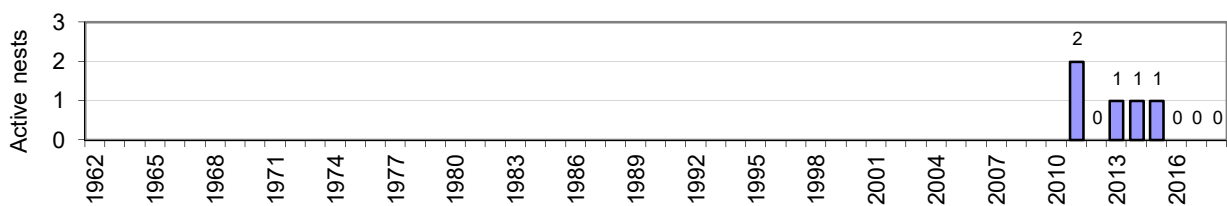### 37 Wisemans

Little Desert
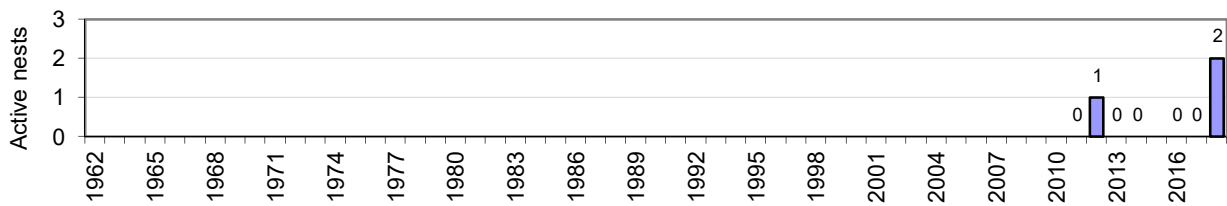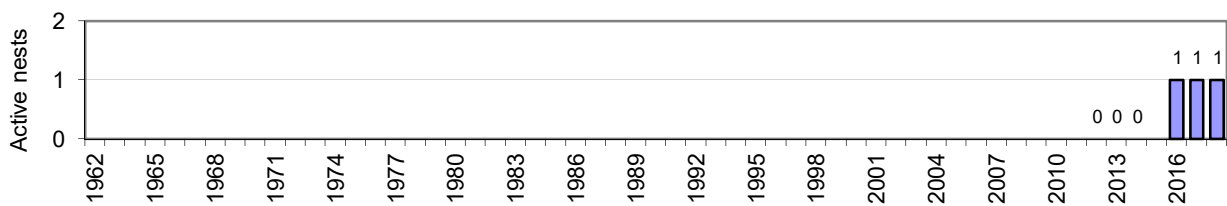

38 Tooan
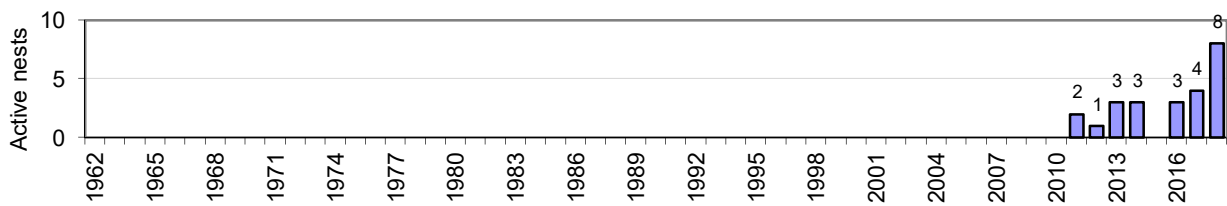
Little Desert

39 Oldfields
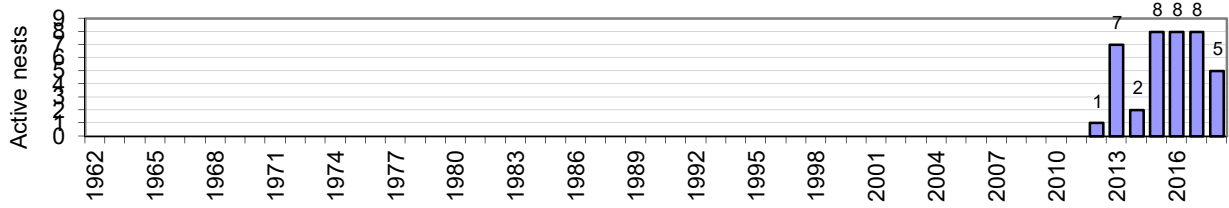
Little Desert
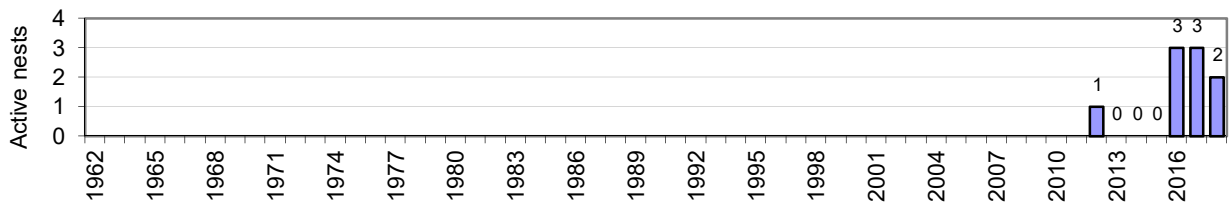

40 Iluka

Little Desert

41 Mali Dunes

Little Desert

42 Cooak

Little Desert

43 Thorpes

Little Desert