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Advice to Natural Resource Management Bodies Regarding Management and Monitoring of Malleefowl

A report commissioned by the Mallee CMA and multi-regional “National Malleefowl Monitoring, Population Assessment and Conservation Action Project” steering committee.

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Preamble

The multi regional “National Malleefowl Monitoring, Population Assessment and Conservation Action Project” is a two year NHT funded project that implements key components of the National Malleefowl Recovery Plan. The general aims of the project are to:

- Collate existing Malleefowl monitoring data for analysis
- Interpret breeding density trends in the light of management practices and environmental variables
- Develop a consistent national monitoring system and a national database, and foster on-going and self-sufficient monitoring that facilitates government, private and community monitoring programs.
- Develop the monitoring program in the future so that management actions that are most beneficial to Malleefowl conservation can be identified and demonstrated, and integrate this knowledge into outcomes for conservation on private and public land across Australia.
- Involve all stakeholders in this project and provide advice to regional NRM bodies on how best to promote Malleefowl conservation within their region.

This report addresses the last of these aims and is arranged in two parts. Firstly, general information and advice on Malleefowl management is provided for NRM bodies. This section summarizes the species conservation status, threats, recovery actions and ways in which the NRM organizations can become involved in the Malleefowl monitoring and adaptive management program. Secondly, brief regional summaries of the distribution, abundance and monitoring of Malleefowl within each NRM region are provided in Appendix 1.

Background

Malleefowl conservation status

Nationally, the Malleefowl is listed as Vulnerable under the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999*. This classification is qualified by international standards (IUCN 2001, criteria VU A1c,e and A2b,c,e).

The Malleefowl occurs in all mainland states except Queensland and is recognised as threatened wherever it occurs:

- In the Northern Territory, Malleefowl is listed as Critically Endangered under the *Territory Parks and Wildlife Conservation Act 2000* and the species may be extinct.
- In New South Wales, Malleefowl is listed as Endangered under the *Threatened Species Conservation Act 1995*.
- In South Australia, Malleefowl is listed as Vulnerable under the *National Parks and Wildlife Act 1972 – Schedule 8*.
- In Victoria, Malleefowl is listed under the *Flora and Fauna Guarantee Act 1988*, and is regarded as Endangered.
- In Western Australia, Malleefowl is listed as Fauna that is rare or is likely to become extinct under Schedule 1 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2005*.

Threats to Malleefowl

Many potential threats to Malleefowl populations have been identified, although the importance of each of these may vary greatly in different circumstances. Only an overview is presented here; further details and references may be found in the National Recovery Plan for Malleefowl.

Clearing and fragmentation

- Clearing of the mallee for wheat and sheep production has been the major factor in the decline of Malleefowl in southern Australia. The best habitats for Malleefowl tended to be on land desirable for agriculture and have been almost entirely cleared.
- Clearing has not only removed Malleefowl habitat, but has also degraded remaining habitat due to fragmentation and dryland salinity. Malleefowl are not strong fliers and habitat fragmentation results in small and isolated populations of the species that are especially vulnerable to local extinction by a range of processes.
- Apart from agriculture, new clearing threats are emerging that are targeting remaining areas of Malleefowl habitat. These include mining (especially mineral sands mining), waste containment facilities, harvesting of mallee eucalypts for charcoal or oil, and the harvesting of Broombush (*Melaleuca uncinata*) for building materials.
- Malleefowl are protected in every state in which they occur and clearing applications are unlikely to be granted for areas where existing populations are

known. However, Malleefowl are elusive and rare, their presence may easily be missed.

Fire

- Fire is a natural part of the ecology of mallee habitat. However, large and frequent fires are a major threat to the conservation of Malleefowl because populations may suddenly be eliminated from vast areas that are burnt, and because recovery in the burnt area to densities that occurred before the fire appears to be very slow, requiring 30 to 60 years.
- The potential scale and frequency of fire in mallee habitats is such that even the largest reserves may be entirely consumed by a single fire.
- If fires burn patchily, the deleterious effects are mitigated in both the short and long-term.
- Intentional broad-scale and frequent burning has been advocated as a pastoral management technique in some states to increase forage production. In areas that support Malleefowl, such practices are likely to greatly reduce or even eradicate the species.
- In central Australia, traditional burning practices by Aborigines may protect habitats important for Malleefowl and create a mosaic of different aged habitats which may suppress very large fires.

Over grazing

- Malleefowl breeding densities may be reduced by 90% in areas grazed by sheep, and other herbivores may be similarly damaging at high densities. Rabbits are usually rare in mallee habitats except at the mallee edge, but other herbivores such as goats, deer, cattle, camels, and kangaroos may be abundant in some areas, particularly where water sources are available.
- The effects of these herbivores are twofold. Firstly, grazing and browsing denies Malleefowl of food that may otherwise be available to them. Secondly, when maintained at high densities herbivores may cause long-term change to the structure and floristic diversity of habitats.
- Over-abundance of herbivores is especially important after fire when vegetation is regenerating, and where herbivore numbers are maintained at high levels by the availability of water. By benefiting large grazing animals, water sources affect the distribution and abundance of native plants and animals for a radius of at least 10 km.

Predation

- Predation by the introduced fox, and to a lesser extent by cats, dogs and raptors, is a major cause of mortality of Malleefowl. Foxes in particular are known to take Malleefowl at all stages of the bird's life cycle and to be a major threat to captive reared Malleefowl released into the wild.
- The threat of predation on Malleefowl is likely to be highest when other prey is suddenly reduced, such as when rabbit numbers are suddenly reduced, such as following the spread of rabbit haemorrhagic disease, which as this may lead to 'prey-switching' by foxes

- While many Malleefowl are eaten by foxes, recent studies have found no evidence that fox baiting as currently practised across Australia is effective at benefiting Malleefowl despite demonstrated reductions in fox numbers. The relationship between fox predation and Malleefowl declines thus remains unclear.
- There is some evidence that interactions occur between predators in many arid areas and that dingoes may suppress both foxes and cats. Foxes are probably the most efficient predators of Malleefowl and baiting can reduce their numbers, but this also reduces dingo numbers and may increase in cat numbers. It is unclear how the relationship between these predators, and the available methods of their control, can best be manipulated to benefit Malleefowl

Climate change

- Current predictions of climate change for Australia suggest that changes in rainfall and temperatures, and concomitant changes in habitats, are likely to threaten Malleefowl over their entire range. If these predictions are correct, and if the changes are not arrested, substantial declines in Malleefowl populations are likely.

Conserving Malleefowl

The National Malleefowl Recovery Plan prescribes a series of objectives and actions that are needed to recover Malleefowl populations to sustainable levels (outlined in Box 1). The plan was prepared collaboratively and represents a general consensus among a range of authorities including managers, scientists and community groups with an interest in Malleefowl conservation.

Here, some additional points are made in regard to the actions that are discussed and detailed in the National Malleefowl Recovery Plan.

Management of Malleefowl and their environment

- Management recommendations in the National Malleefowl Recovery Plan are general and pertain to varying degrees across the range of Malleefowl and on public, leasehold and private land.
- Prerequisites of all the management actions in the recovery plan at a regional level include 1) adequate mapping of likely Malleefowl habitat, threats and management (i.e. grazing from introduced herbivores, fire, predator control, fragmentation and road kill black-spots), 2) setting regional targets for reducing threats, and 3) systematic reporting against these targets on a regular basis.
- As a general rule, monitoring sites should not be singled out for special management. Rather, management at monitoring sites should reflect that of other similar sites where Malleefowl occur within the NRM region.
- Special management should only be applied to monitoring sites where it is part of a carefully designed and statistically robust experiment which will clarify the benefits of particular management actions. Monitoring sites only represent a tiny proportion of the species range and this restraint on management is unlikely to adversely affect the species.

- Currently, an adaptive management program is being developed that may influence management at and near Malleefowl monitoring sites across Australia. Until these plans develop further, current management regimes should continue in the vicinity of monitoring sites and these sites should not be singled out for special management.
- There is some uncertainty about how to best manage Malleefowl populations in different situations and which management actions may be most effective at benefiting the species. To identify best management practice, plans are underway to use monitoring sites across Australia as the foundation for a national adaptive management system (Action 9). A framework for this adaptive management is currently being developed and is expected to be completed by June 2008.

Box 1. Outline of major objectives of the National Malleefowl Recovery Plan (2006-2010)

MANAGING POPULATIONS

- 1: Reduce permanent habitat loss
- 2: Reduce the threat of grazing pressure on Malleefowl populations
- 3: Reduce fire threats
- 4: Reduce predation
- 5: Reduce isolation of fragmented populations
- 6: Promote Malleefowl-friendly agricultural practices
- 7: Reduce Malleefowl mortality on roads

PLANNING, RESEARCH, AND MONITORING

- 8: Provide information for regional planning
- 9: Monitor Malleefowl and develop an adaptive management framework
- 10: Determine the current distribution of Malleefowl
- 11: Examine population dynamics: longevity, recruitment and parentage
- 12: Describe habitat requirements that determine Malleefowl abundance
- 13: Define appropriate genetic units for management of Malleefowl
- 14: Assess captive breeding and re-introduction of Malleefowl
- 15: Investigate infertility and agrochemicals

COMMUNITY INVOLVEMENT AND PROJECT COORDINATION:

- 16: Facilitate communication between groups
- 17: Raise public awareness through education and publicity
- 18: Manage the recovery process

Planning, Research and Monitoring

- A series of objectives are stated and actions prescribed in the National Malleefowl Recovery Plan which involve the collection of information which is needed both to assist in planning management actions, and to evaluate the success or otherwise of management actions across Australia.

- Objective 8 involves the development of regional planning for Malleefowl conservation, and requires GIS mapping of Malleefowl habitat, threats and management actions.
- Objective 9 involves monitoring actions and the development of an adaptive management framework for these monitoring sites. Monitoring sites should aim to be broadly representative of Malleefowl populations within an NRM region.
- Actions involving monitoring and adaptive management in particular are crucial as they link research, management and community and are aimed at producing reliable knowledge on how best to manage Malleefowl populations and their environments. The first of these actions (standardisation, improvement and analysis of monitoring) was funded by a multiregional NHT grant in 2006 and 2007 and has been highly successful. A second phase of the project (database and adaptive management framework) is currently underway and will provide an interactive national monitoring database and a framework for adaptive management.
- While many of these research and planning actions may be conducted by one or more institutions working largely independently, monitoring and adaptive management requires a high degree of collaboration across Australia in order to be most effective. This is because maximising the number of sites and geographic areas will increase the power of analyses and the reliability of knowledge that is gained. Collaboration and cooperation is essential because the Malleefowl monitoring sites currently occur in four states and 15 NRM regions across Australia.

Community involvement and affected interests

- Numerous community groups, state conservation agencies, land managers, NGOs, NRM councils and industries are involved and contribute to Malleefowl conservation. Involvement and cooperation amongst these interested parties will greatly increase the effectiveness of Malleefowl recovery and should be encouraged at every level.
- An effective and productive alliance among monitoring groups, NGOs and some state agencies has been developed as a result of the multi-regional Malleefowl project. The support and involvement of government and NRM authorities is now required to develop adaptive management strategies at monitoring sites.

Opportunities for NRMs involvement in Malleefowl monitoring and adaptive management

Objectives and responsibilities of NRM bodies

Regional NRM bodies are responsible for coordinating the implementation of recovery plans for nationally listed threatened species such as Malleefowl at the regional level, and for monitoring and evaluating their conservation status.

In particular, the current system of Malleefowl monitoring and plans for adaptive management fit neatly into the objectives and responsibilities of NRM bodies, and are consistent with the recommendations and frameworks presented in key NRM documents including reports by the Natural Resource Management Ministerial Council (NRMMC):

- Monitoring and Reporting on Natural Resource Management Users' Guide (2002a)
- National Framework for Natural Resource Management (NRM) Standards and Targets (2002b)
- National Natural Resource Management Monitoring and Evaluation Framework (2002d)
- National Natural Resource Management Capacity Building Framework (2002c)
- Science and Information to support the National Action Plan for Salinity and Water Quality and the Natural Heritage Trust (2003)
- National Biodiversity and Climate Change Action Plan 2004-2007 (2004)
- Framework for future NRM programmes (2006a)
- Impacts of regionally significant invasive vertebrate pests, excluding fish (2006b)
- An interim approach to monitoring significant native species and ecological communities (2006c)

The current system of Malleefowl monitoring and plans for adaptive management are also consistent with external advice provided to the NRMMC:

- Scientific Advice on Natural Resource Management (CSIRO and BOM 2004)
- The Biodiversity Outcomes of the NHT Regional Investment Model: Draft Overview Report (Griffin NRM Pty Ltd. and URS Australia Ltd. 2006)

Benefits to NRM from the Malleefowl monitoring and AM project

- The Malleefowl monitoring program is operational and is able to report on trends in Malleefowl abundance at about 100 sites nationally in 15 NRM regions. Monitoring is undertaken largely by volunteers and land management agencies.
- The monitoring program is also able to report limited information on trends in introduced predators (foxes, cats, dogs) and herbivores (kangaroos, rabbits, goats etc) and some native animals (emus, echidnas, dingos). Signs of all of these animals are recorded at most Malleefowl monitoring sites.

Contributions of NRM toward the Malleefowl monitoring and AM project

NRM bodies are in a position to facilitate the collection of information and documentation regarding management at or near Malleefowl monitoring sites. Such information is important for interpreting changes in Malleefowl abundance and should

be collated at the same time as sites are monitored. Important local management actions include:

- predator control
- herbivore control (eg. rabbits, goats and kangaroos)
- fencing
- landscape changes
- water closures

Information regarding other environmental events is also important and some of these may already be monitored as part of other programs.

- crops activity and history adjacent to monitoring sites
- fire
- local disturbances that may affect Malleefowl populations
- rainfall and other climate data from monitoring sites

Conclusion

The National Malleefowl Recovery Plan provides detailed actions that will help conserve the species and provides a comprehensive review of issues. NRM bodies are encouraged to examine the recovery plan to develop conservation strategies within their regions.

In the current document, an attempt has been made to outline some of the issues involved in conserving Malleefowl and to summarise the distribution and monitoring data within each NMR region. The importance of monitoring has been emphasised, and NRM bodies are advised to support and assist the development of robust monitoring of both Malleefowl and their environment. This is because continued monitoring may be regarded as the lynchpin for effective conservation and a critical foundation for adaptive management. Monitoring provides information on trends in Malleefowl abundance and, when coupled with an appropriate experimental design, provides a powerful means of identifying and refining effective management practices.

Due to a high level of community involvement, finding funds to support the full cost of monitoring Malleefowl is unlikely to be necessary. While these groups will require some funds to cover travel and consumables, and perhaps for key roles such as state/regional facilitators and national database administration, the extensive labour requirement of monitoring Malleefowl is undertaken by volunteers. Systems are being developed to support and sustain this monitoring effort and to make the most of the enthusiasm of volunteers, and there is every reason to believe that the monitoring of Malleefowl will continue in a self-directed and efficient manner for many years to come.

The major issues remaining in progress toward a national adaptive management system for Malleefowl is the development of an appropriate experimental design, and the involvement of land managers so that specific ideas on how best to manage and conserve Malleefowl can be tested. The development of an appropriate adaptive management design is currently being investigated and should pose few problems considering the number of sites that are currently monitored around Australia. Involving land managers and influencing management presents a much greater challenge due to the dispersed nature of Malleefowl monitoring which currently

occurs in 15 NRM regions in four states. The success or otherwise of the adaptive management process will depend largely on the willingness of NRM regions, state authorities and land managers, as well as community groups, researchers and academics, to work collaboratively toward improved conservation outcomes for Malleefowl.

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Natural Resource Management Ministerial Council Science and Information Working Group. 2003. Science and Information to support the National Action Plan for Salinity and Water Quality and the Natural Heritage Trust. Australian Government Department of Agriculture/Department of Environment and Heritage NAP/NHT Management Team, Canberra.

Appendix 1 Summaries of the distribution, abundance and monitoring of Malleefowl in NRM regions

The following brief accounts provide summaries of Malleefowl sightings records and monitoring sites in each of 22 NRM regions across Australia in which the species has been recorded on at least ten occasions. Each summary provides a concise statement of the known distribution of Malleefowl within each NRM region, a plot of distribution records, and a summary of Malleefowl monitoring that is already occurring in each NRM. Distribution records and the number of monitoring sites in these NRM regions is further summarised in Table 2 to facilitate comparisons across regions.

Table 1. The number of Malleefowl records (to 2005) in 22 NRM regions for which summary accounts have been produced. The records have been sorted into seven time periods contain similar numbers of Malleefowl records across Australia. Total S shows the total number of records, and Total M the total number of monitoring sites (including some being established). Sighting data are from the National Malleefowl Recovery Plan (2006-2010) where they were compiled from numerous sources.

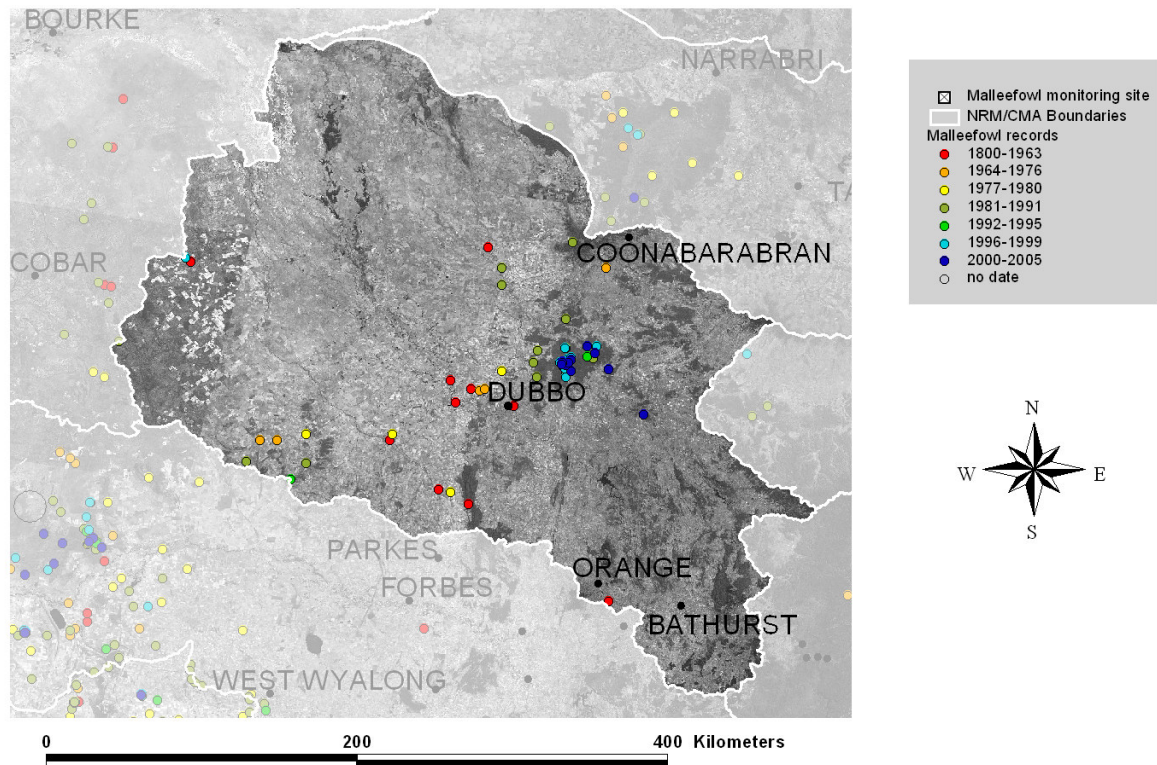
	NRM region name	Before 1963	1964-1976	1977-1980	1981-1991	1992-1995	1996-1999	2000-2005	Total S	Total M
VIC	Mallee	107	88	172	63	26	37	71	564	25
WA	Avon	49	99	59	21	100	97	73	498	5
SA	Murray Darling Basin	74	66	84	64	34	37	96	455	31
WA	Rangelands (WA)	81	74	58	99	37	32	30	411	3
WA	South Coast Region	25	12	28	26	199	51	31	372	2
NSW	Lower Murray/Darling	8	17	25	27	29	72	51	229	3
SA	Eyre Peninsula	26	23	21	36	23	53	37	219	5
SA	South East (SA)	17	21	21	52	6	59	29	205	4
WA	Northern Agricultural Region	26	33	29	27	15	18	52	200	5
NSW	Lachlan	15	30	33	75	13	17	11	194	3
VIC	Wimmera	13	22	42	11	10	24	33	155	2
NSW	Murrumbidgee	8	29	36	46	1	3	2	125	0
WA	South West Region	47	14	13	12	19	11	6	122	1
NSW	Central West	19	7	18	20	3	13	17	97	0
SA	Aboriginal Lands	10	4	3	12	17	8	40	94	2
SA	Northern and Yorke Agricultural District	5	8	2	14	3	9	19	60	1
SA	Rangelands (SA)	8	8	1	4	-	1	16	38	1
VIC	North Central	20	-	2	3	1	4	-	30	4
NSW	Western	6	5	3	12	-	-	-	26	0
NT	Northern Territory	19	1	-	-	-	-	-	20	0
NSW	Namoi	-	3	5	5	-	2	1	16	0
WA	Swan	3	4	3	-	-	-	1	11	0
	Total	586	568	658	629	536	548	616	4141	97

Malleefowl have also been recorded in an additional five other NRM regions (Table 2), but these records are rare and probably reflect vagrants or outliers of the original range of the species, and are not considered further.

Table 2. The number of Malleefowl records (to 2005) in NRM region in which the species has been only rarely recorded. The records have been sorted into seven time periods contain similar numbers of Malleefowl records across Australia. Data from the National Malleefowl Recovery Plan (2006).

State	NRM region name	Before 1963	1964- 1976	1977- 1980	1981- 1991	1992- 1995	1996- 1999	2000- 2005	Total
VIC	Port Phillip and Westernport	2	-	-	-	-	-	-	2
VIC	Glenelg Hopkins	-	-	-	6	-	-	-	6
SA	Mount Lofty Ranges and Greater Adelaide	3	-	-	-	-	-	-	3
NSW	Hawkesbury/Nepean	-	1	-	-	-	-	-	1
NSW	Hunter/Central Rivers	-	-	-	2	-	1	-	3
Total		5	1	0	8	0	1	0	15

1. NSW Central West CMA Region



Malleefowl records

Historically, Malleefowl were known from all five bioregions that comprise the Central West CMA region, although the species has been most frequently recorded in the Brigalow Belt South bioregion which is also the only bioregion where they still reliably occur. Although the Malleefowl reporting rate in the Central West CMA region has been relatively constant over the past few decades, the distribution of Malleefowl has nonetheless declined greatly; the species may no longer occur south or west of Dubbo where extensive clearing has removed habitat in the vicinity of virtually all past Malleefowl records. The current range of the species appears to be restricted to the Goonoo, Cobbora and Yarrobil State Forests where, interestingly, there are no records of the species prior to the 1980s.

Table 3. The number of Malleefowl records (to 2005) in the Central West CMA region sorted by time periods that contain similar numbers of records across Australia. Numbers are indicative only and may contain records duplicated across different databases. Data from the National Malleefowl Recovery Plan (2006).

NRM region	Before 1963	1964-1976	1977-1980	1981-1991	1992-1995	1996-1999	2000-2005	Total
Central West	19	7	18	20	3	13	17	97
Total Australia	591	569	658	637	536	549	616	4156

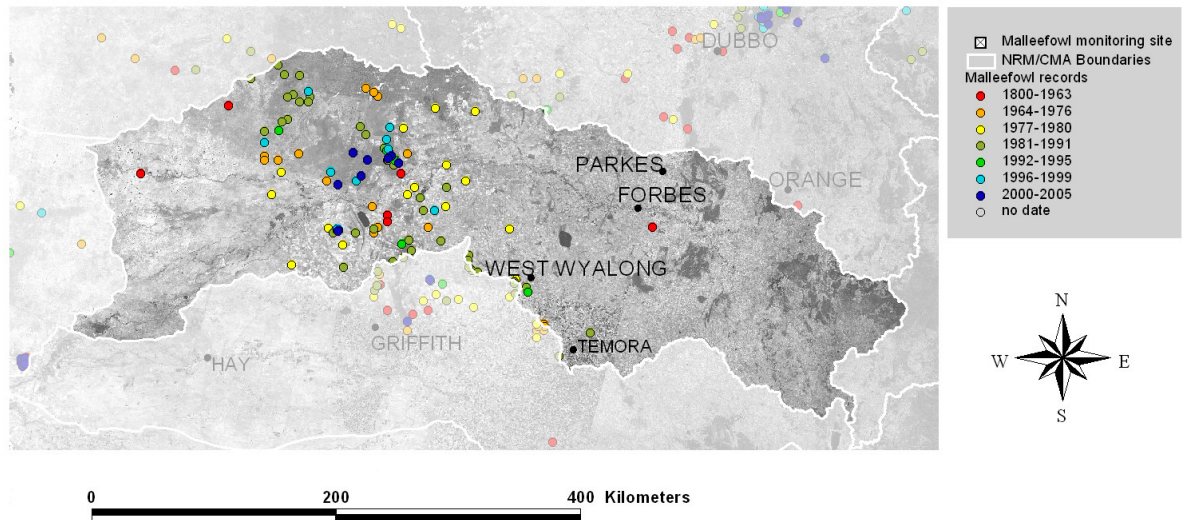
Monitoring sites

- There are no monitoring sites in the Central West NRM region, although locals and State Forests staff have shown an interest in Malleefowl at Goonoo State Forest and may conduct informal monitoring.

Priorities for Malleefowl monitoring

- Collating information on the past and current distribution and breeding numbers of Malleefowl in the Goonoo Cobbora and Yarrobil State Forests would be helpful for assessing the conservation status of the species in this area, and may provide a basis for designing an appropriate monitoring system.
- Developing a system for reliably and systematically monitoring the status of Malleefowl at the Goonoo State Forest should be regarded as a high priority in the Central West CMA region. Monitoring sites would provide useful benchmarks for management and provide a means of assessing the success or otherwise of different management approaches. Monitoring techniques used in other arid areas of NSW, SA and WA may be more appropriate than those used in areas where the species is more numerous.
- There is uncertainty in how to manage Malleefowl populations and a program of experimental and adaptive management, informed by monitoring and coordinated across multiple regions, is recommended in order to develop effective management practices.

2. NSW Lachlan CMA Region



Malleefowl records

Historically, Malleefowl were most often recorded from the central portion of the Lachlan CMA region in the Murray Darling Depression and Cobar Penepplain bioregions where the species was widespread. The species still seems widely distributed in large expanses of uncleared habitat north of the Lachlan River where Malleefowl are known to still occur at Nombinnie, Round Hill and Yathong Nature Reserves (despite the lack of records, Malleefowl have been recorded at Yathong NR since 2000). Captive reared Malleefowl have been released at Yathong and Nombinnie NR since the early 1990s.

Elsewhere in the Lachlan CMA region Malleefowl have declined greatly in recent decades, and this trend is reflected in the declining reporting rate. In particular, clearing has removed most habitat south of the Lachlan River where Malleefowl were known to occur at high densities, and only very small and isolated patches of habitat remain which are inadequate to sustain the birds in the long term without intensive management. Malleefowl have already disappeared from most of these*; and in the past decade the species have only been recorded at one conservation reserve south of the Lachlan (Loughnan NR) where the rate of reports has declined sharply in recent years.

Malleefowl was also known from scattered locations in the NSW South Western Slopes bioregion where there are old records from the vicinity of Forbes (late 1800s) and Orange (early 1900s), as well as more recent records in the vicinity of West Wyalong and Temora (last records were in 1992 and 1982 respectively).

* For example, Stackpoole NR, Gubbata NR, Blue Mallee SF, The Charcoal Tank NR, and Ingalba NR south of the Lachlan River, and Tolingo NR north of the river.

Table 4. The number of Malleefowl records (to 2005) in the Lachlan CMA region sorted by time periods that contain similar numbers of records across Australia. Numbers are indicative only and may contain records duplicated across different databases. Data from the National Malleefowl Recovery Plan (2006).

NRM region	Before 1963	1964- 1976	1977- 1980	1981- 1991	1992- 1995	1996- 1999	2000- 2005	Total
Lachlan	15	30	33	75	13	17	11	194
Total Australia	591	569	658	637	536	549	616	4156

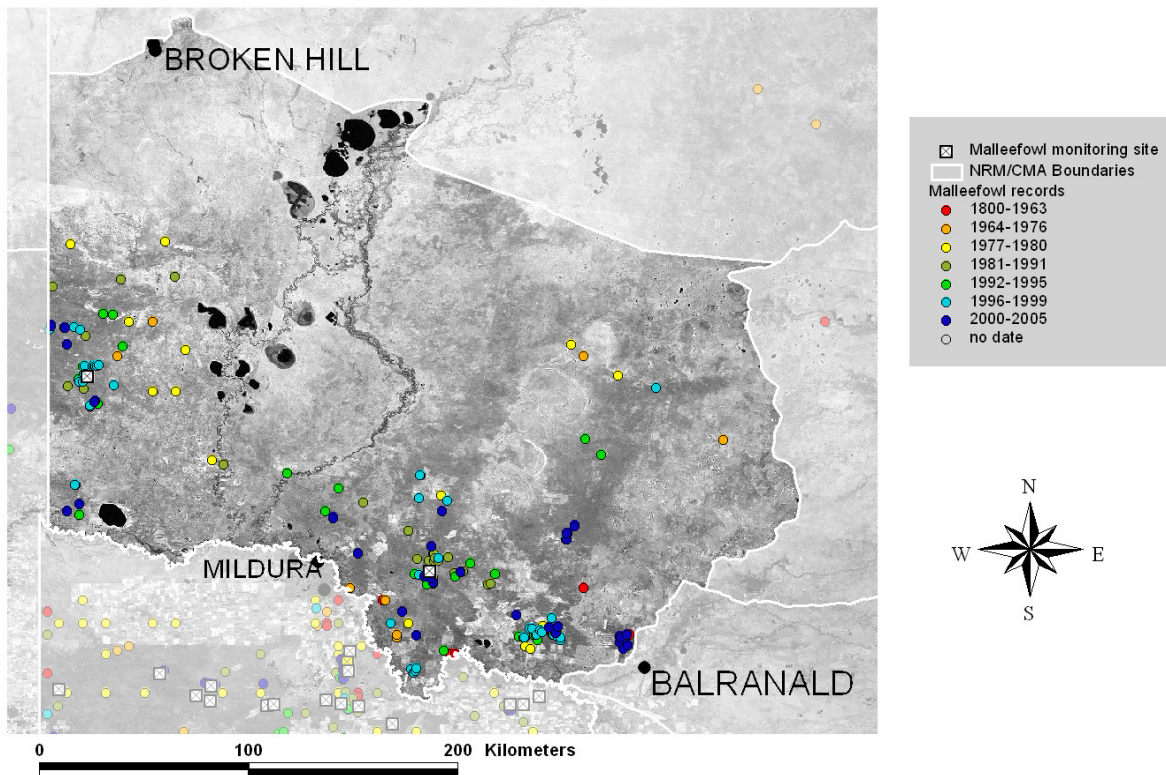
Monitoring sites

- Monitoring of Malleefowl breeding density is undertaken at Nombinnie/ Round Hill, and Yathong conservation reserves by the DECC using a helicopter to randomly sample habitat and count active mounds.
- There are no community based monitoring sites in the Lachlan NRM region.

Priorities for Malleefowl monitoring

- Continuation of monitoring at all sites is essential for conservation efforts.
- Determining whether Malleefowl still occur at Loughnan NR should be regarded as a high priority. If Malleefowl do still occur at the reserve, a monitoring program should be established in order to provide benchmarks for management and provide a means of assessing the success or otherwise of different management approaches. Community based monitoring would be appropriate at Loughnan NR, and national standards should be observed to maintain consistency.
- There is uncertainty in how to manage Malleefowl populations and a program of experimental and adaptive management, informed by monitoring and coordinated across multiple regions, is recommended in order to develop effective management practices.

3. NSW Lower Murray/Darling CMA Region



Malleefowl records

Historically, Malleefowl have been recorded over much of the southern half of the Lower Murray/Darling CMA region within the Murray Darling Depression bioregion where the species is widespread in both conservation reserves and grazing leaseholds. Areas of particular importance include suitable habitat between the Murray and Darling Rivers south of Lake Mungo (including Mallee Cliff NP and leaseholds), Tarawi NR and leaseholds to the north and south comprising similar habitat, and the south west corner of NSW west of Lake Victoria.

Malleefowl have been more frequently recorded in the Lower Murray/Darling CMA region than any other in NSW: about one third of all Malleefowl records in NSW originate from this CMA region and this proportion has increased to nearly two thirds in the past 15 years. Although there the distribution of Malleefowl appears to have contracted from the open scrublands within 40 km west of the Darling Anabranch, and in the north-west and (perhaps) north-east of the region, overall the distribution of recent records in the Lower Murray/Darling CMA region suggests that Malleefowl still occur over most of their original range. Similarly, the number of records over the last few decades show an increase rather than a decline which is probably due to both an increase in Malleefowl numbers (as shown by DECC monitoring), and increased survey effort.

Table 5. The number of Malleefowl records (to 2005) in the Lower Murray/Darling CMA region sorted by time periods that contain similar numbers of records across Australia. Numbers are indicative only and may contain records duplicated across different databases. Data from the National Malleefowl Recovery Plan (2006).

NRM region	Before 1963	1964- 1976	1977- 1980	1981- 1991	1992- 1995	1996- 1999	2000- 2005	Total
Lower Murray/Darling	8	17	25	27	29	72	51	229
Total Australia	591	569	658	637	536	549	616	4156

Monitoring sites

- There are two established monitoring sites in the Lower Murray/Darling CMA region. DECC have regularly monitored Malleefowl breeding numbers at Mallee Cliffs NP since 1989, and at Tarawi NR since 1997, and are currently establishing sites on leaseholds in the vicinity of Mylatchie. A standard set of known and marked nests is visited each year by helicopter over large areas (active nests are also visited on foot).
- Monitoring involves the inspection of 255 mounds at these two sites over a total area of several hundred square kilometres.

Priorities for Malleefowl monitoring

- Continuation of monitoring at all sites is essential for conservation efforts.
- Establishing more monitoring sites throughout the species current range in the Lower Murray/Darling CMA would provide useful benchmarks for management and provide a means of assessing the success or otherwise of different management approaches.
- There is uncertainty in how to manage Malleefowl populations and a program of experimental and adaptive management, informed by monitoring and coordinated across multiple regions, is recommended in order to develop effective management practices.

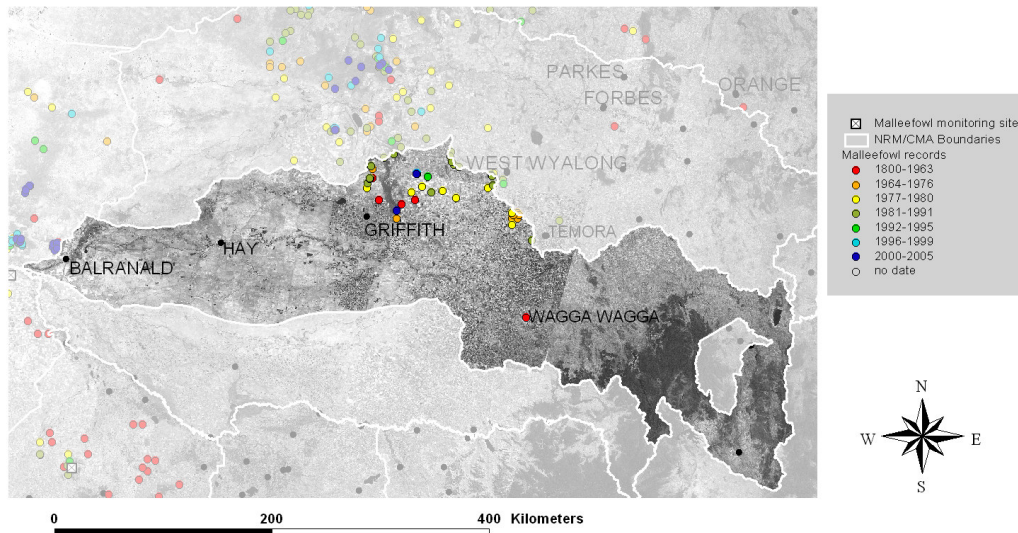
Current Monitoring Site details

Site#	Site_name	Location and tenure	Area (km ²)	1st data	Seasons (to 2005/6)	Mounds (2005/6)	Avg. Active (to 2005/6)	Patch size (km ²)	Trend (to 2005/6)
n01	Mallee Cliffs	Mallee Cliffs NP	250 ⁽¹⁾	1989	16	148	9.9	>1000km ²	+ve
n02	Tarawi	Tarawi NR	140 ⁽¹⁾	1997	8	107	4.2 ⁽²⁾	>1000km ²	+ve
n03	Mylatchie		??	??xx	??			>1000km ²	

(1) Area approximate and not strictly bounded

(2) Average shown is for the period 2002-2005. Before this time sections were progressively added each year and calculation of averages less meaningful.

4. NSW Murrumbidgee CMA Region



Malleefowl records

Historically, Malleefowl were only recorded in the Murrumbidgee CMA region from the area to the north and east of Griffith in the Cobar Penneplain bioregion, and in the NSW Western Slopes bioregion to the east Griffith at least as far south as Ingalbra NR (near Temora) where the species was recorded on numerous occasions until the early 1980s. A few records exist from Wagga Wagga, 70 km further south than Ingalbra NR, from the late 1800s but these might refer to the general area rather than immediate vicinity of the town.

Malleefowl have declined greatly in the Murrumbidgee CMA region. Clearing has removed suitable habitat and the very few patches that remain are small and isolated and offer little prospect of conserving the species without intensive management. In the past decade, Malleefowl have only been recorded at two locations in the Murrumbidgee CMA region: numerous sightings of the birds have been recorded at a small (<600ha) patch of mallee that is managed for commercial eucalypt production (often referred to as Yalgogrin) and where the species has been studied by DECC scientists, and at Binya State Forest where Malleefowl have only been recorded once and are probably not resident. Pulletop NR (north of Griffith) was the site of intensive studies on Malleefowl ecology by CSIRO scientists in the 1950s and represented high quality Malleefowl habitat. Almost half of all Malleefowl records from the Murrumbidgee CMA region originate from this tiny remnant (145 ha) although the species has not been recorded at Pulletop NR since the late 1980s. Similar declines have occurred at other small remnants such as Buddigower NR and the species is close to extinction in the Murrumbidgee CMA region.

It is possible that Malleefowl may inhabit mallee at the far western edge of the Murrumbidgee CMA region to the north-east of Balranald. A number of Malleefowl

recent sightings on uncleared pastoral land just out across the boundary with the Lower Darling CMA region suggest that the species might also occur in the Murrumbidgee region.

Table 6. The number of Malleefowl records (to 2005) in the Murrumbidgee NRM region sorted by time periods that contain similar numbers of records across Australia. Numbers are indicative only and may contain records duplicated across different databases. Data from the National Malleefowl Recovery Plan (2006).

NRM region	Before 1963	1964- 1976	1977- 1980	1981- 1991	1992- 1995	1996- 1999	2000- 2005	Total
Murrumbidgee	8	29	36	46	1	3	2	125
Total Australia	591	569	658	637	536	549	616	4156

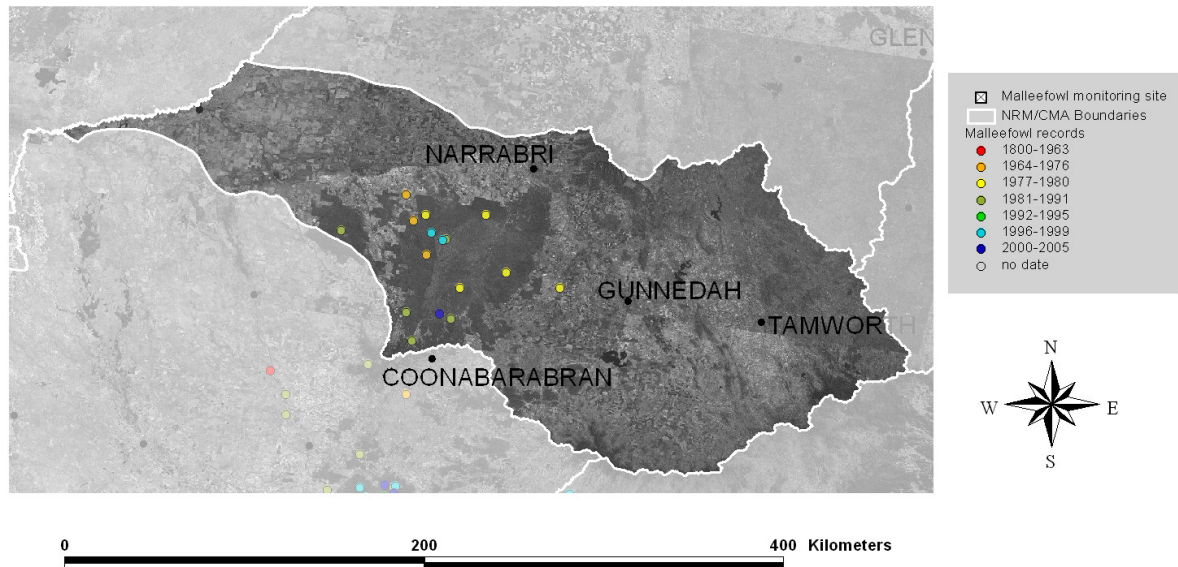
Monitoring sites

- DECC monitored Malleefowl breeding numbers at the Yalgogrin eucalyptus harvesting site during the 1990s and have published these results. However the site is currently not monitored.

Priorities for Malleefowl monitoring

- The current status of Malleefowl in reserves and other habitat remnants in the Murrumbidgee CMA region should be investigated with some urgency. It is possible that the Yalgogrin site is the only remaining population in the region and DECC studies indicate that it has been in steep decline. Monitoring at this site should start immediately if the Malleefowl population is still extant in order to provide a means of assessing the success or otherwise of different management approaches. Community based monitoring would be suitable at this site and should conform to national standards.
- Given the uncertainty in how best to manage Malleefowl populations, a program of experimental and adaptive management which is informed by monitoring and coordinated across multiple regions, is recommended in order to develop effective management practices.

5. NSW Namoi CMA Region



Malleefowl records

Malleefowl are known from scattered records in the Pilliga forest, a large semi-arid woodland north of Coonabarabran (Brigalow Belt South bioregion), comprising a mix of Nature Reserves, Community Conservation Areas, State Forests and private land. Malleefowl were probably always scarce in the Pilliga, although recent records suggest that the species persists there. The number of Malleefowl records has dropped off since the 1980s suggesting a decline in the species, possibly related to widespread fires over the past 15 years which have burnt much of the woodlands.

Table 7. The number of Malleefowl records (to 2005) in the Namoi CMA region sorted by time periods that contain similar numbers of records across Australia. Numbers are indicative only and may contain records duplicated across different databases. Data from the National Malleefowl Recovery Plan (2006).

NRM region	Before 1963	1964- 1976	1977- 1980	1981- 1991	1992- 1995	1996- 1999	2000- 2005	Total
Namoi	-	3	5	5	-	2	1	16
Total Australia	591	569	658	637	536	549	616	4156

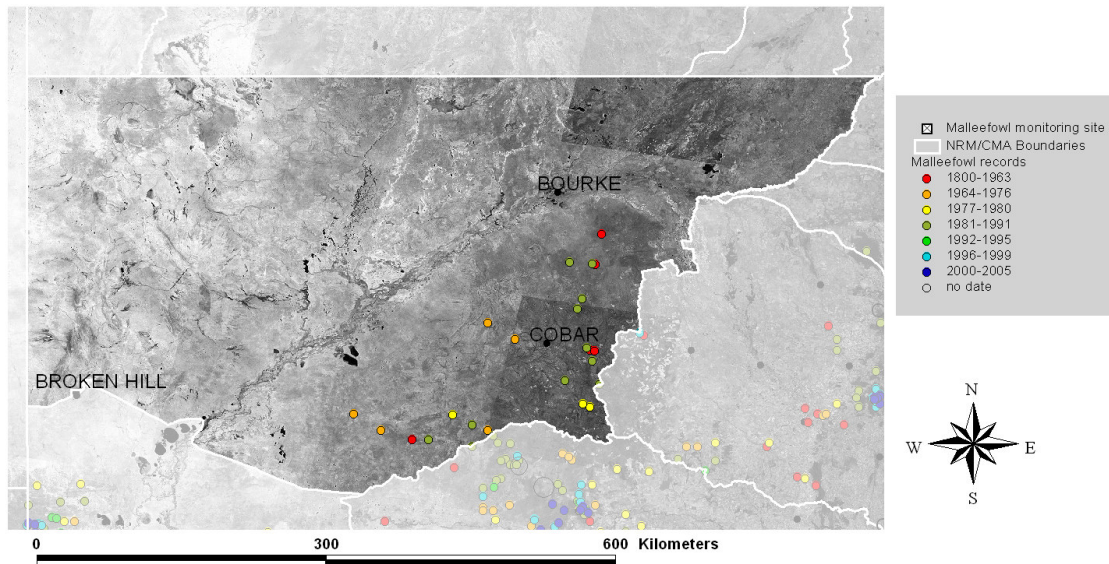
Monitoring sites

- There are no monitoring sites in the Namoi NRM region and no obvious sites at which regular monitoring might be conducted.

Priorities for Malleefowl monitoring

- Surveys for Malleefowl in the Pilliga would be helpful for understanding the apparent decline of Malleefowl in this reserve. Further records of Malleefowl may also be obtained by soliciting records from locals.

6. NSW Western CMA Region



Malleefowl records

Historically, Malleefowl were only known from the south east of the Western CMA region (Murray Darling Depression and Cobar Peneplain bioregions), an area consisting mostly of pastoral leaseholds. There have been no records in the region since 1991 when the species was reported at Canbelego State Forest where it was first reported in 1908, and near Wilga Downs 90 km to the north. The species' range appears to have declined markedly in the past few decades and it may already be locally extinct in the Western CMA, although a more recent Malleefowl record (1996) between Cobar and Nyngan just outside the Western CMA boundary provides some reason to be hopeful that the species still persists in the rangelands in low numbers.

Table 8. The number of Malleefowl records (to 2005) in the Western CMA region sorted by time periods that contain similar numbers of records across Australia. Numbers are indicative only and may contain records duplicated across different databases. Data from the National Malleefowl Recovery Plan (2006).

NRM region	Before 1963	1964- 1976	1977- 1980	1981- 1991	1992- 1995	1996- 1999	2000- 2005	Total
Western	6	5	3	12	-	-	-	26
Total Australia	591	569	658	637	536	549	616	4156

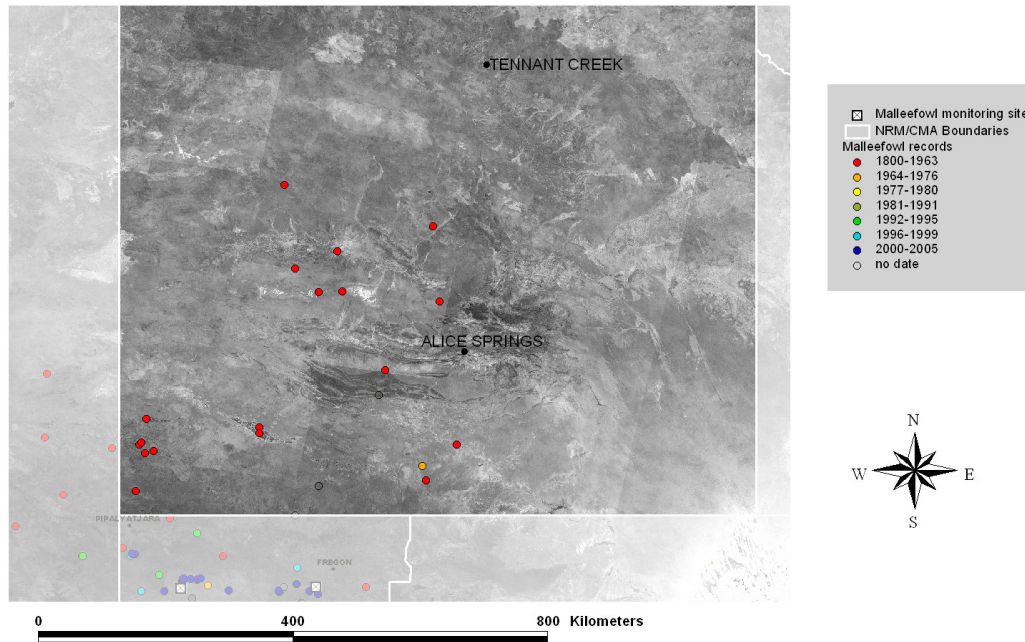
Monitoring sites

- There are no monitoring sites in the western NRM region and no obvious sites at which regular monitoring might be conducted.

Priorities for Malleefowl monitoring

- Further past and current records of Malleefowl would be helpful for understanding this species decline within Western NRM region and this might be best achieved by soliciting records from pastoralists and other locals.

7. NT Northern Territory NRM Region



Malleefowl records

Historically, Malleefowl were recorded from scattered locations across the southern Northern Territory in the late 1800s and early 1900s. Their distribution and abundance have declined dramatically since then and the species may be extinct in the Northern Territory; the most recent records being from the southern Tanami Desert in 1950 and south east of Eralunda in 1965. However, the re-discovery of Malleefowl on the Aboriginal Lands in SA and WA in recent years provides some hope that the species may also still occur in remote parts of the Northern Territory, especially near the border of these states.

Table 9. The number of Malleefowl records (to 2005) in the Northern Territory NRM region sorted by time periods that contain similar numbers of records across Australia. Numbers are indicative only and may contain records duplicated across different databases. Data from the National Malleefowl Recovery Plan (2006).

NRM region	Before 1963	1964- 1976	1977- 1980	1981- 1991	1992- 1995	1996- 1999	2000- 2005	Total
Northern Territory	20	1	-	-	-	-	-	21
Total Australia	591	569	658	637	536	549	616	4156

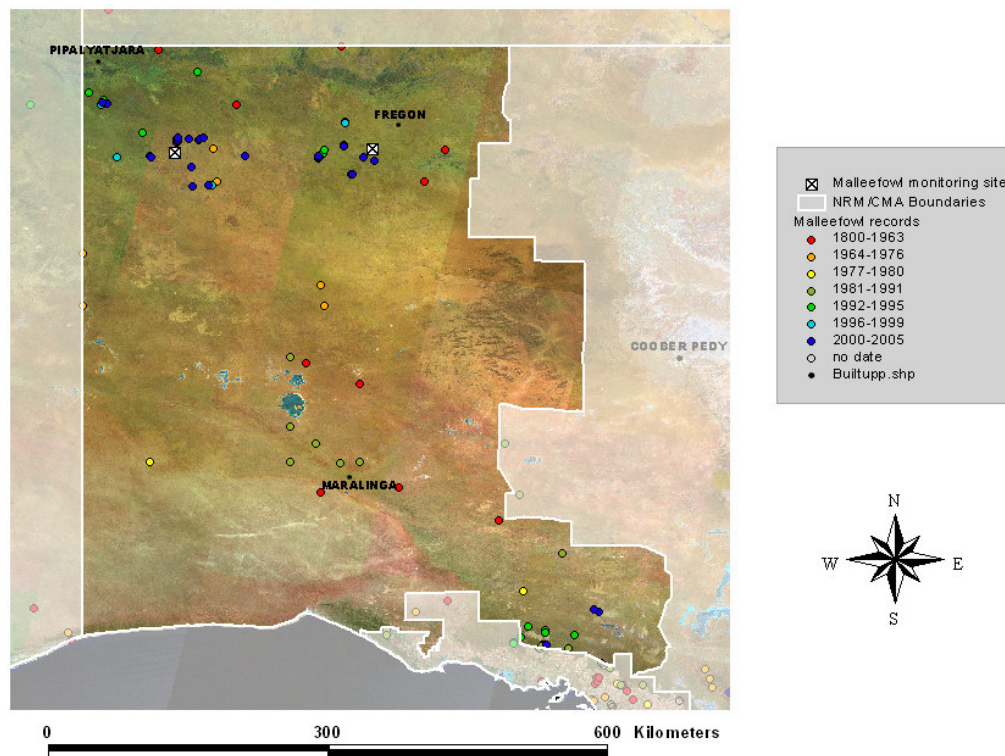
Monitoring sites

- There are no Malleefowl monitoring sites in the Northern Territory NRM region and no sites at which regular monitoring might be conducted.

Priorities for Malleefowl monitoring

- Past and current records of Malleefowl within Northern Territory NRM region should be solicited from traditional owners on Aboriginal land, and from pastoralists in areas where the species has previously been recorded. Targeted surveys of selected areas would also be of benefit. Although Malleefowl are easily overlooked in remote areas, their presence in an area can be detected relatively easily by their footprints.

8. SA Alinytjara Wilurara (Aboriginal Lands) NRM Region



Malleefowl records

Historically, Malleefowl were recorded from scattered locations across the Alinytjara Wilurara NRM region. Their numbers were thought to have declined markedly in central Australia until the 1990s when collaborative surveys of the Anangu-Pitjantjatjara Yankunytjatjara- Lands revealed that the species still occurred at several localities. Since then, Anangu have recorded Malleefowl at numerous sites and it appears the species occurs sporadically across a vast landscape, primarily within the Great Victoria Desert bioregion. Recent biological surveys conducted by regional ecologists of the Department for Environment and Heritage have confirmed that Malleefowl still occur in reasonable numbers further south in the Maralinga Tjarutja Lands as well. Although Malleefowl have not been officially recorded in the Maralinga Tjarutja Lands since the 1980s, there has been little specific effort to search for the species or record the knowledge of traditional owners; the absence of records does not necessarily imply the absence of the species. Malleefowl have also been recorded at Yumberra CP, including some recent records, where it seems to occur at very low densities.

Table 10. The number of Malleefowl records (to 2005) in the Aboriginal Lands NRM region sorted by time periods that contain similar numbers of records across Australia. Numbers are indicative only and may contain records duplicated across different databases. Data from the National Malleefowl Recovery Plan (2006).

NRM region	Before 1963	1964- 1976	1977- 1980	1981- 1991	1992- 1995	1996- 1999	2000- 2005	Total
Alinytjara Wilurara	10	4	3	12	17	8	40	94
Total Australia	591	569	658	637	536	549	616	4156

Monitoring sites

- Monitoring occurs at both the Walalkara and Watarru IPAs in the Anangu-Pitjantjatjara Yankunytjatjara Land and involves the inspection of known mounds over a total area of several thousand square kilometres. Monitoring is conducted by IPA rangers and supervised by APYLM and DEH project officers.
- In central Australia, Malleefowl monitoring involves revisiting mounds that are known by traditional owners or have been found opportunistically or during wide scale searches. Monitoring techniques developed in southern Australia which involve thoroughly searching circumscribed areas for mounds are not practicable in central Australia where Malleefowl are scarce and highly dispersed.
- Some data on the occurrence of foxes/dogs, rabbits, kangaroos, goats, and emus at mounds is also collected and provides some measure of the trends in abundance of these animals.

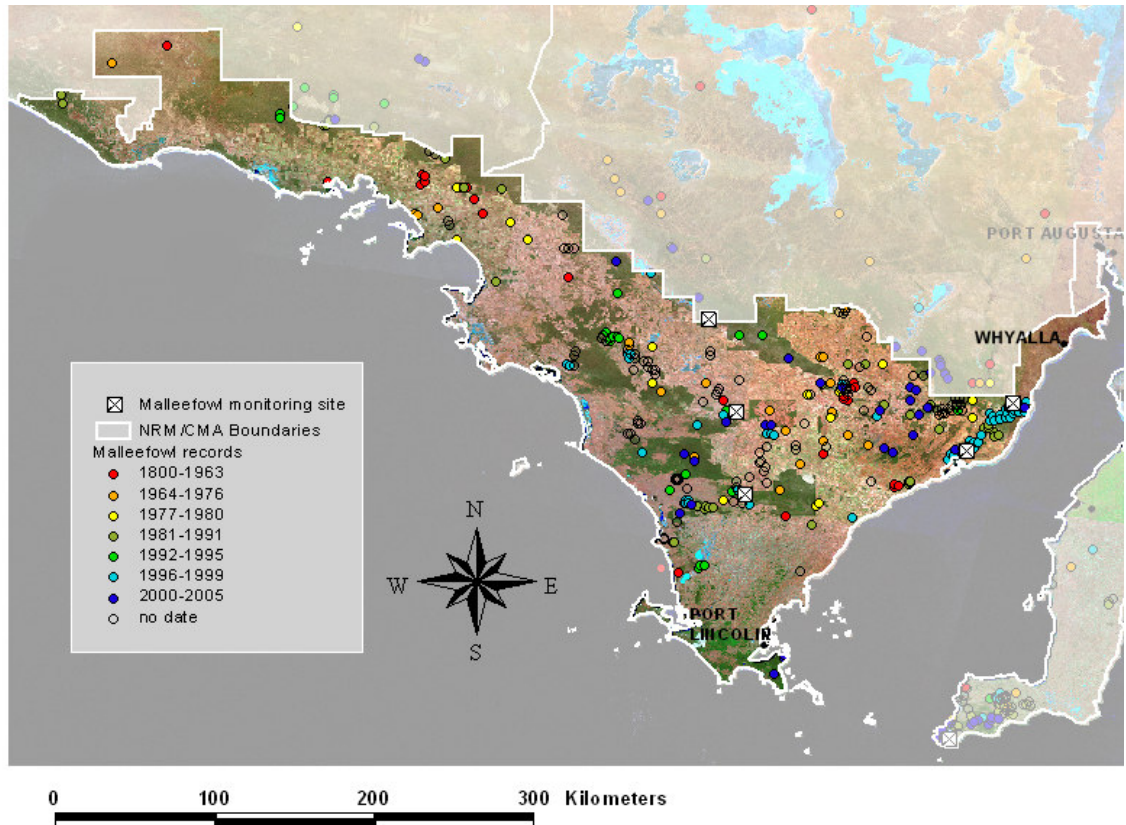
Priorities for Malleefowl monitoring

- Knowledge of the distribution and abundance of Malleefowl in the APYL has increased enormously over the past decade or so due to collaborative projects involving Anangu, APYLM, and DEH SA. There are now over 20 mounds known in the APYL, providing an excellent base from which to monitor Malleefowl trends. Further development of the monitoring system is required to make it more effective, to facilitate the flow of information, and to report the information back to Anangu within regional and national context.
- Establishing more monitoring sites, especially in the Maralinga Tjarutja Lands, would provide useful benchmarks for management. DEH SA have already undertaken targeted surveys and close collaboration with traditional owners and these surveys will form the basis of future monitoring programs. In the APYL, the current monitoring would benefit from the inclusion of more mounds and may be best achieved by Anangu.
- There is uncertainty in how to manage Malleefowl populations and a program of experimental and adaptive management, informed by monitoring and coordinated across multiple regions, is recommended in order to develop effective management practices.

Current Monitoring Site details

Site#	Site_name	Location and tenure	Area	1st data	Seasons (to 2005/6)	Mounds¹ (2005/6)	Avg. Active² (to 2005/6)	Patch size km²	Trend (to 2005/6)
A01	Watarru	Watarru IPA and Kuntytjaru	>1000	1995	6			>1000	
A02	Walalkara	Walalkara IPA and Makiri	>1000	1995	8			>1000	

9. SA Eyre Peninsula NRM Region



Malleefowl records

Historically, Malleefowl were once distributed across a much of the Eyre Peninsula NRM region. Most of the older records were from areas that have since been cleared. However, Malleefowl still occur in most areas where their habitat has not been cleared, including in numerous reserves* and in landscape configurations that range from large continuous habitat patches of hundreds of square kilometres or more, to fragmented landscapes in which Malleefowl occur in small remnants with poor interconnectedness (such as in the north east of the region in the Mangalo area). The large patches tend to support low densities of the species but tend to be reasonably well connected, whereas the smaller remnants often support higher densities but are threatened by low numbers and isolation which may make the persistence of Malleefowl in these small isolated untenable in the long term without careful management.

*Such as Barwell CR, Bascombe Well CP, Caralue Bluff CR, Gawler Ranges CR, Hambridge CR, Heggaton CR, Hincks CR, Munyaroo CP, Pinkawillinie CP, Port Lincoln NP, Sheoak Hill CR/CP, Yeldulknie CP, and Yumbarra CP. Malleefowl have also been recorded near other reserves and it is possible that they occur in low densities at Kuliparu (several records nearby in 1990s), Cocata CP/CR (records 1968 and 1980), and Wahgunyah NP (Malleefowl were recorded just nearby in 1990).

private land: recent sighting also off reserves east of Shannon most areas in which they Malleefowl currently occur over there original range but this is now fragmented due to clearing.

Elsewhere, areas in which Malleefowl have previously been recorded are now cleared and no longer support the species.

Table 11. The number of Malleefowl records (to 2005) in the Eyre Peninsula NRM region sorted by time periods that contain similar numbers of records across Australia. Numbers are indicative only and may contain records duplicated across different databases. Data from the National Malleefowl Recovery Plan (2006).

NRM region	Before 1963	1964- 1976	1977- 1980	1981- 1991	1992- 1995	1996- 1999	2000- 2005	Total
Eyre Peninsula	26	23	21	36	23	53	37	219
Total Australia	591	569	658	637	536	549	616	4156

Monitoring sites

- There are five Malleefowl monitoring site in the region located at Pinkawillinie CP, Hincks NP, Munyaroo CP, Lock (HA between Hambridge and Barwell CR), and Cowell (on Martin's HA 9km north east of Cowell).
- Declines in Malleefowl breeding numbers have occurred at the Cowell site which has been monitored for over a decade, whereas other sites have been monitored over shorter periods and trends are less apparent or convincing.
- Malleefowl monitoring currently involves the inspection of 215 mounds at the five sites over a total area of about 23 km². Monitoring is conducted by volunteers supervised by Eyre Peninsula NRM and DEH project officers.
- Monitoring methods are consistent with national standards, although in the past not every mound at each site was visited making some early records difficult to interpret.
- Data on the occurrence of foxes/dogs, rabbits, kangaroos, goats, and emus at mounds is also collected and provides some measure of the trends in abundance of these animals.

Priorities for Malleefowl monitoring

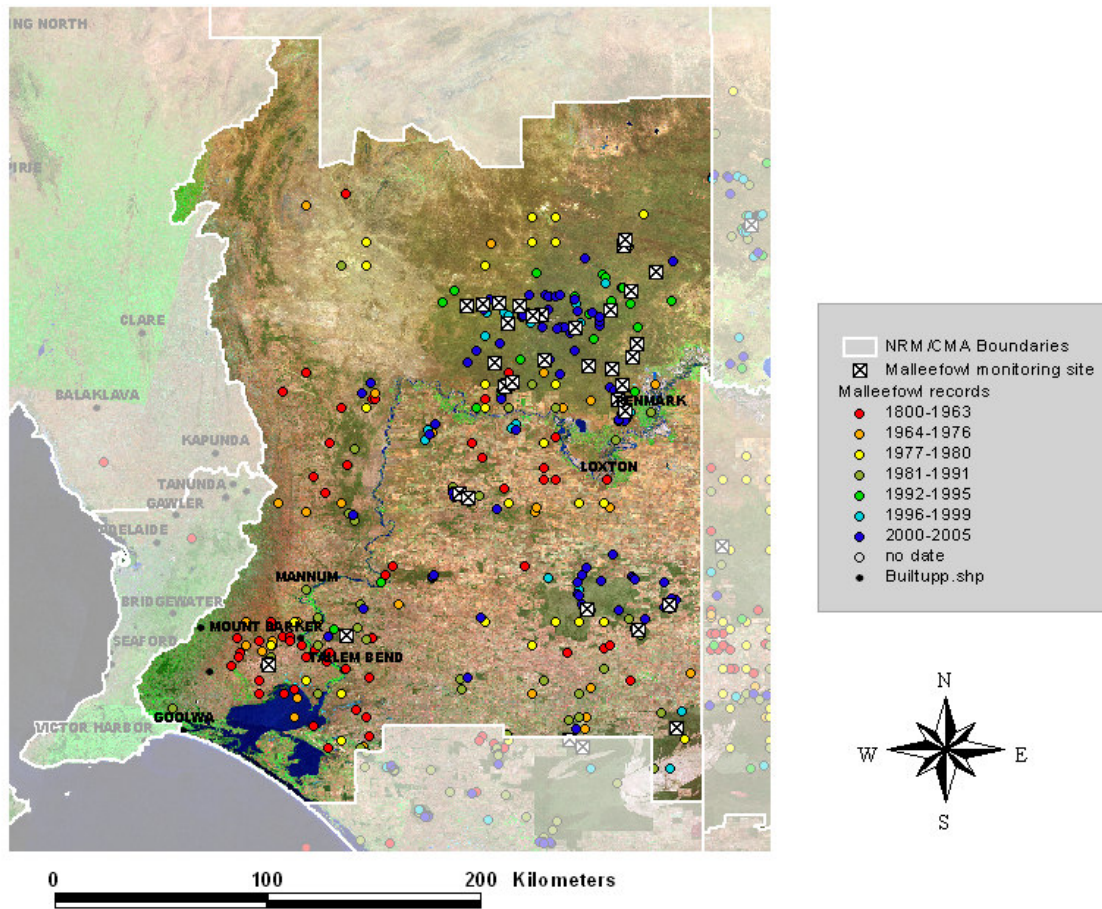
- Malleefowl still occur over most of their original range within the Eyre Peninsula NRM where suitable habitat remains. Thousands of square kilometres of mostly continuous habitat is remnant in this area and may support a considerable population of Malleefowl. However, where Malleefowl occur in highly fragmented landscapes, such as in the north east of the region where there have been recent sightings of Malleefowl in numerous small and isolated remnants, the species is likely to decline for demographic reasons unless this threat is managed.
- Establishing more monitoring sites, especially in the severely fragmented landscapes, would provide useful benchmarks for management and provide a means of assessing the success or otherwise of different approaches. However, finding volunteers to monitor more sites may limit the number of sites the region could maintain.

- There is uncertainty in how to manage Malleefowl populations and a program of experimental and adaptive management, informed by monitoring and coordinated across multiple regions, is recommended in order to develop effective management practices.

Current Monitoring Site details

Site#	Site_name	Location and tenure	Area	1stdata	Seasons (to 2005/6)	Mounds ¹ (2005/6)	Avg. Active ² (to 2005/6)	Patch size km ²	Trend (to 2005/6)
S01	Cowell 1 & 2	Martins HA	5.6	1995	8	56	6.5	13	-ve
S16	Munyaroo	Munyaroo CP	4.0	2003	2	39	3.0	>1000	0
S17	Hincks CP	Hincks CP	4.0	1998	4	37	2.0	750	+ve
S18	Pinkawillinie	Pinkawillinie CP	4.0	1998	3	27	0.3	>1000	?-ve
S64	Lock	HA prov. Land	5.5	2003	3	56	6.3	5.5	0
			23.1		20	215	18.1		

10. SA Murray Darling Basin NRM



Malleefowl records

Malleefowl were once distributed across most of the Murray Darling Basin NRM region, with the exception of the far north and north east (Flinders Lofty Block bioregion). Most of the old records were from areas that are now cleared and no longer support the species, but Malleefowl have persisted in numerous small blocks of habitat scattered across the region, and in the larger blocks such as Billiat CP, Scorpion Springs CP and north of the Murray River in uncleared pastoral habitats.

Table 12. The number of Malleefowl records (to 2005) in the Murray Darling Basin region sorted by time periods that contain similar numbers of records across Australia. Numbers are indicative only and may contain records duplicated across different databases. Data from the National Malleefowl Recovery Plan (2006).

NRM region	Before 1963	1964-1976	1977-1980	1981-1991	1992-1995	1996-1999	2000-2005	Total
Murray Darling Basin (SA)	74	66	84	64	34	37	96	455
Total Australia	591	569	658	637	536	549	612	4156

Monitoring sites

- There are 31 Malleefowl monitoring sites in the Murray Darling Basin NRM Region involving 760 mounds over a total area of about 100 km².
- Most monitoring sites are situated in the driest parts of the Malleefowl's range within the region: there are 23 sites north of Loxton in the South Olary plains, and eight sites in the higher rainfall areas that have been largely cleared south of the Murray.
- Of the eight sites south of Loxton, two are large patches of mallee habitat near the Victorian border (in Billiat CP and Ngarkat/Scorpion Springs CP), and five are in small remnants scattered across the region (Bakara, Shorts, Karte, Ferries Macdonald, Peebinga, and the Murray Bridge Army Training Area).
- There has been a severe decline in Malleefowl breeding numbers over the past decade at the most well established sites in the region, including Cooltong, Dangali, Pooginook, Bakara, Shorts and Ferries Macdonald. These sites sample Malleefowl populations from the south west to north east limits of the region and would appear to provide a reasonable representation of the region as a whole.
- Monitoring methods are consistent with national standards, including most of the early records, although in the past not every mound at each site was visited making some early records difficult to interpret.
- Data on the occurrence of foxes/dogs, rabbits, kangaroos, goats, and emus at mounds is also collected and provides some measure of the trends in abundance of these animals since the early 1990s.

Priorities for monitoring

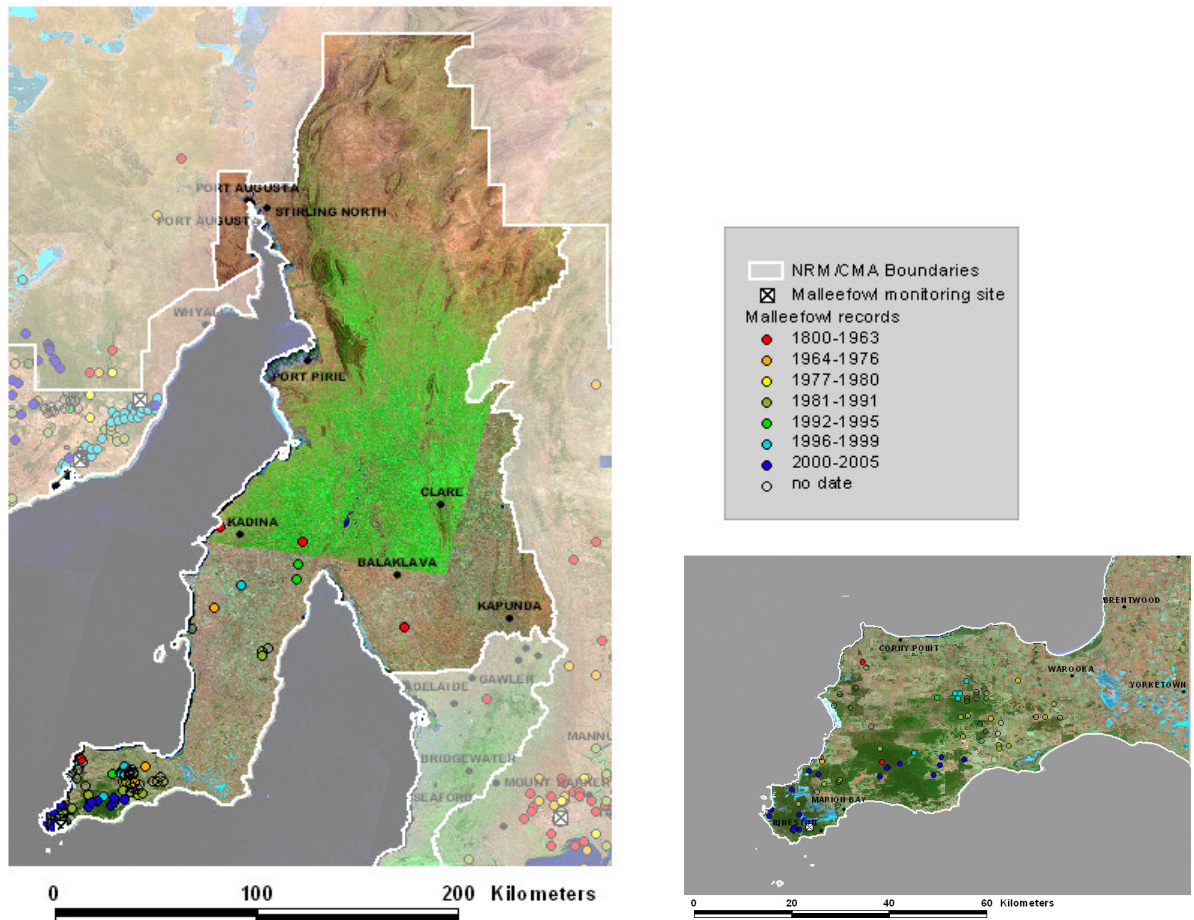
- The Murray Darling Basin region has a large number of Malleefowl monitoring sites and most habitat types and landscape configurations are well represented, although many of these sites have only recently been established or are infrequently monitored. Consolidating this system of monitoring sites should be regarded as a high priority and this process is currently being undertaken by DEH.
- Malleefowl conservation within the Murray Darling Basin NRM region will depend on both the species' persistence in the highly fragmented habitat south of Loxton, as well as in the large areas of low rainfall habitat north of the Murray River of which most is now reserved in one form or another. Severe declines in Malleefowl breeding numbers have been demonstrated in both these landscapes in recent years.
- There is uncertainty in how to reverse the decline of Malleefowl in the Murray Darling Basin region and the species has declined severely despite considerable investments in management. A program of experimental and adaptive management, informed by monitoring and coordinated across multiple regions, is recommended in order to develop reliable and effective management practices.
- Further monitoring sites in small habitat remnants would be desirable, but is not a high priority given the number and spread of existing sites and need to

consolidate the program. Opportunities for new monitoring sites include isolated remnants at or near Stockyard Plain (between Blanchetown and Waikerie), Goondooloo, surrounding Billiat CP, and between Mt Mary and Morgan.

Current Monitoring Site details

Site#	Site_name	Location and tenure	Area	1stdata	Seasons (to 2005/6)	Mounds ¹ (2005/6)	Avg. Active ² (to 2005/6)	Patch size km ²	Trend (to 2006/7)
S03	Cooltong	Cooltong CP	4.0	1993	13	48	4.4	>1000	-ve
S04	Calperum Oakbore	Calperum Oakbore	2.0	1996	1	14		>1000	
S05	Dangali 1	Dangali CP 1	1.0	1993	10	19	0.5	>1000	-ve
S06	Pooginook	Pooginook CP	4.0	1990	15	36	3.5	>1000	-ve
S07	Bakara	Bakara CP	4.2	1989	15	68	8.7	27	-ve
S08	Shorts	Shorts HA	2.5	1989	13	57	4.2	5	-ve
S09	Chowilla	Chowilla RR	2.0	1995	8	20	0.5	>1000	0
S10	Ferries McDonald	Ferries McDonald CP	3.5	1990	10	74	7.5	9	-ve
S15	Dangali 2	Dangali CP 2	1.0	1993	10	9	0.2	>1000	? -ve
S19	Taylorville	Taylorville	6.0	1999	3	38		>1000	
S21	Dry Frogamerry	Dry Frogamerry	4.0	1999	3	57		>1000	
S22	Overflow South	Overflow South	4.0	2004	2	5		>1000	
S23	Overflow North	Overflow North	4.0	2004	2	3	0.5	>1000	
S24	Timor West	Timor West	4.0	2004	2	15		>1000	
S25	Timor Central	Timor Central	4.0	2004	2	1		>1000	
S29	Ral Ral	Ral Ral	4.0	2004	2	14		>1000	
S30	Stony Pinch 1	Stony Pinch 1	4.0	2004	2	10	0.5	>1000	
S35	Taylorville West	Taylorville West	4.0	2004	2	10		>1000	
S36	Taylorville East	Taylorville East	4.0	2004	2	3		>1000	
S44	Peebinga	Peebinga CP	4.0	2001	3	61	3.7	70	? -ve
S45	Karte	Karte CP	4.0	2001	2	21	0.5	36	
S46	Billiatt	Billiatt CP	4.0	2001	2	13	0.5	800	
S47	Ngarkat 1	Ngarkat CP 1	4.0	2001	2	9		>1000	
S52	Gluepot 3	Gluepot	2.0	2004	2	27		>1000	
S54	Gluepot 5	Gluepot	2.0	2004	2	16	0.5	>1000	
S56	Gluepot 7	Gluepot	2.0	2004	2	14		>1000	
S57	Gluepot 8	Gluepot	2.0	2004	2	10	0.5	>1000	
S59	Gluepot 11	Gluepot	2.0	2004	2	12		>1000	
S60	Gluepot 12	Gluepot	2.0	2004	2	16		>1000	
S63	Gluepot 15	Gluepot	2.0	2004	2	13		>1000	
Sxx	MBATA	Murray Bridge Army Training Area	4.0	1999	1	47	7.0	16	
			100.2		141	760	43.2		

11. SA Northern and Yorke NRM Region



Malleefowl records

Historically, Malleefowl were distributed across a wide area on Yorke Peninsula, whereas only one sighting of Malleefowl (from 1839) has been recorded elsewhere in the Northern and Yorke NRM region. Malleefowl currently occur only in the far south of Yorke Peninsula at Innes NP and on surrounding private land where suitable vegetation has been preserved. Elsewhere, areas in which Malleefowl have previously been recorded are now cleared and no longer support the species.

Table 13. The number of Malleefowl records (to 2005) in the Northern and Yorke NRM region sorted by time periods that contain similar numbers of records across Australia. Numbers are indicative only and may contain records duplicated across different databases. Data from the National Malleefowl Recovery Plan (2006).

NRM region	Before 1963	1964-1976	1977-1980	1981-1991	1992-1995	1996-1999	2000-2005	Total
Northern and Yorke	5	8	2	14	3	9	19	60
Total Australia	591	569	658	637	536	549	612	4156

Monitoring sites

- There is only one Malleefowl monitoring site in the region and it is located at Innes NP.
- Malleefowl breeding numbers appeared relatively stable between 1992 and 2005 at the Innes site.
- Malleefowl monitoring currently involves the inspection of 52 mounds at the Innes site over a total area of about 2.6 km².
- Monitoring methods are consistent with national standards, although in the past not every mound at each site was visited making some early records difficult to interpret.
- Data on the occurrence of foxes/dogs, rabbits, kangaroos, goats, and emus at mounds is also collected and provides some measure of the trends in abundance of these animals.

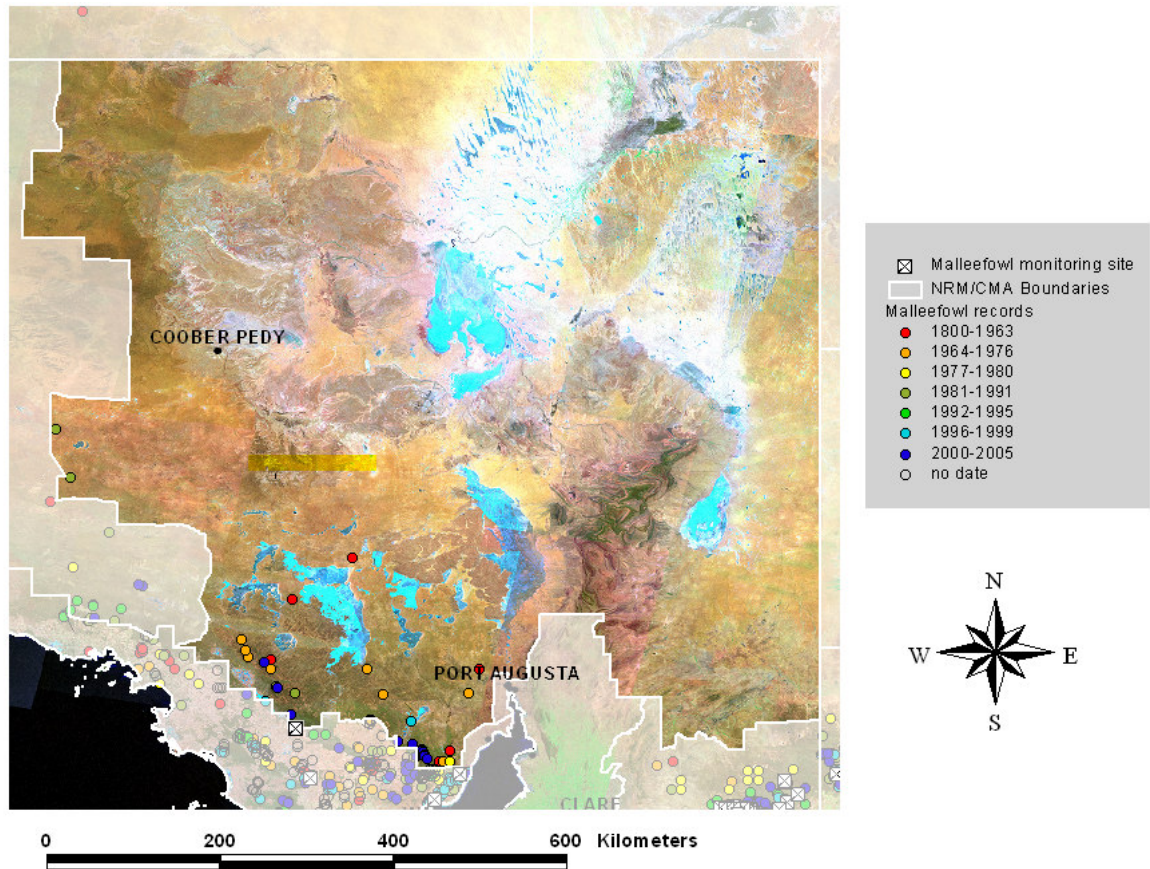
Priorities for Malleefowl monitoring

- Malleefowl now occur only in the southern tip of Yorke Peninsula at Innes NP and the uncleared habitat to the north east of the park (comprising Warrenben CP and unreserved land). Several hundred square kilometres of mostly continuous habitat is remnant in this area and it is possible that this habitat supports a considerable population of Malleefowl.
- More monitoring sites would be desirable, especially outside the Innes NP. High intensity fox baiting and other management is conducted in Innes NP and additional monitoring sites outside this area would provide a standard for comparison and help clarify the benefits of intensive management.
- There is uncertainty in how to manage Malleefowl populations and a program of experimental and adaptive management, informed by monitoring and coordinated across multiple regions, is recommended in order to develop effective management practices.

Current Monitoring Site details

Site#	Site_name	Location and tenure	Area	1st data	Seasons (to 2005/6)	Mounds ¹ (2005/6)	Avg. Active ² (to 2005/6)	Patch size km ²	Trend (to 2006/7)
S13	Innes	Innes NP	2.6	1992	6	52	7.0	65	0

12. SA Rangelands NRM Region



Malleefowl records

Historically, Malleefowl were only ever recorded in the south west of the Rangelands NRM region, including in the Gawler Ranges, the vicinity of Lake Gairdner, south and north-east of Lake Gillies and west of Port Augusta. Within this area, the range of the species appears to have contracted to the south and recent records are confined to the Gawler Ranges and south of Lake Gillies where there have been numerous recent sightings.

Table 14. The number of Malleefowl records (to 2005) in the Rangelands NRM region sorted by time periods that contain similar numbers of records across Australia. Numbers are indicative only and may contain records duplicated across different databases. Data from the National Malleefowl Recovery Plan (2006).

NRM region	Before 1963	1964- 1976	1977- 1980	1981- 1991	1992- 1995	1996- 1999	2000- 2005	Total
Rangelands (SA)	8	8	1	4	0	1	16	38
Total Australia	591	569	658	637	536	549	616	4156

Monitoring sites

- Malleefowl monitoring occurs in the Gawler Ranges NP.
- Monitoring involves the inspection of several known mounds over an area of hundreds of square kilometres. Monitoring is conducted by ???xx and supervised by DEH project officers.xx???
- Malleefowl monitoring in the Rangelands NRM region involves revisiting mounds that have previously been found opportunistically. In southern Australia, sites are established by thoroughly searching circumscribed areas for mounds, but this method of establishing sites is not practicable in Central Australia where Malleefowl are scarce and highly dispersed.

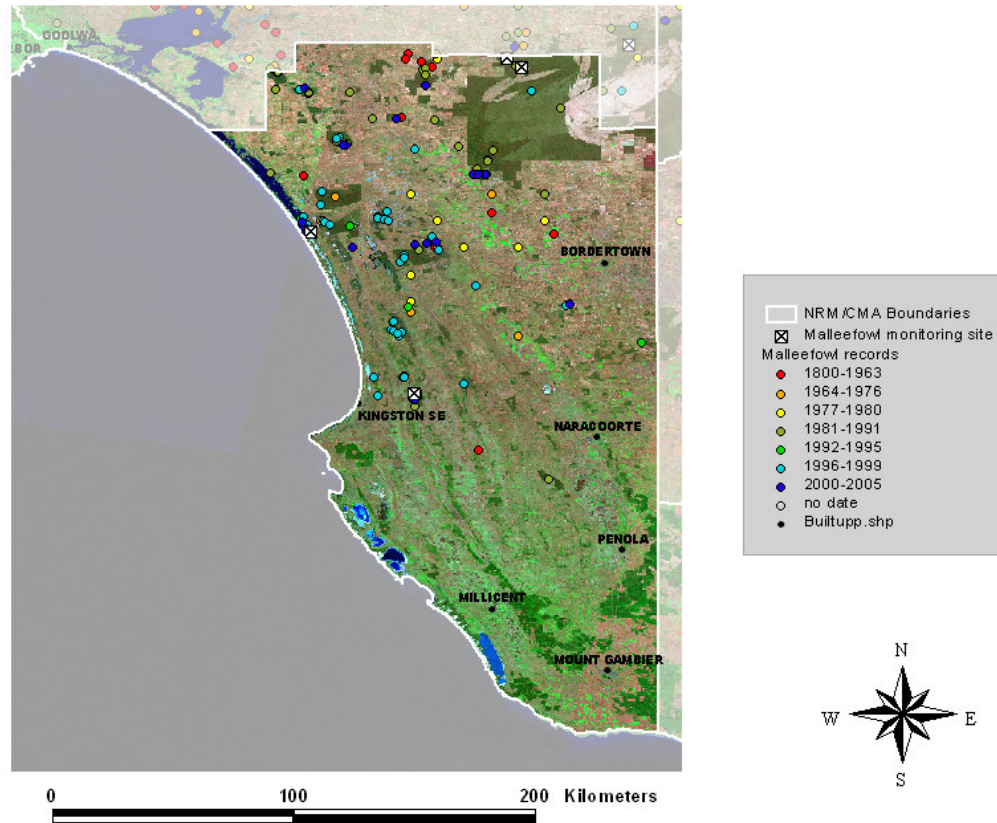
Priorities for Malleefowl monitoring

- Further development of the monitoring system is required to make it more effective, to facilitate the flow of information, and to report the information within regional and national context.
- In the Gawler Ranges, the current monitoring would benefit from the inclusion of more mounds. Establishing another monitoring site south of Lake Gillies would also provide useful benchmarks for management.
- There is uncertainty in how to manage Malleefowl populations and a program of experimental and adaptive management, informed by monitoring and coordinated across multiple regions, is recommended in order to develop effective management practices.

Current Monitoring Site details

Site#	Site_name	Location and tenure	Area	1stdata	Seasons (to 2005/6)	Mounds ¹ (2005/6)	Avg. Active ² (to 2005/6)	Patch size km ²	Trend (to 2005/6)
S??	Gawler Ranges	Mostly within Gawler Ranges NP			?	?	?	>1000 km ²	

13. SA South East NRM



Malleefowl records

Historically, Malleefowl were distributed across a wide area in the northern half of the South East NRM region. While many records were from areas that are now cleared and no longer support the species, Malleefowl have persisted in a number of small conservation reserves and on private land where suitable vegetation has been preserved. Only one large reserve occurs within the region (Ngarkat CP/Mt Rescue CP), but there have been few recent records of Malleefowl in this patch and most recent records are from isolated remnants scattered across the northern half of the region.

Table 15. The number of Malleefowl records (to 2005) in the South East NRM region sorted by time periods that contain similar numbers of records across Australia. Numbers are indicative only and may contain records duplicated across different databases. Data from the National Malleefowl Recovery Plan (2006).

NRM region	Before 1963	1964-1976	1977-1980	1981-1991	1992-1995	1996-1999	2000-2005	Total
South East (SA)	17	21	21	52	6	59	29	205
Total Australia	591	569	658	637	536	549	612	4156

Monitoring sites

- There are four Malleefowl monitoring sites in the South East NRM Region. Ngarkat 2 and Ngarkat 3 are located in the north of Ngarkat Conservation Park and sample mallee-heath vegetation. The Coorong monitoring site is a thin strip of coastal mallee habitat between the Princes Highway and the Coorong (Lake Alexandrina) in the Coorong National Park. The Mt Scott monitoring site is situated with Mt Scott Conservation Park, east of Kingston SE. DEH (SA) supervises the monitoring at all sites in the region.
- The two Ngarkat monitoring sites were established in 2001 and only one active mound was recorded (at Ngarkat 3). The sites have not been monitored consistently since then and trend information is not available.
- At the Coorong site Malleefowl breeding numbers appeared stable between 1996 and 2003 but declined sharply in 2005.
- Malleefowl monitoring currently involves the inspection of 95 mounds at the four sites within the South East NRM Region. Monitoring sites cover a total area of about 16 km².
- Monitoring methods are consistent with national standards, although in the past not every mound at each site was visited making some early records difficult to interpret.
- Data on the occurrence of foxes/dogs, rabbits, kangaroos, goats, and emus at mounds is also collected and provides some measure of the trends in abundance of these animals.

Priorities for new monitoring sites

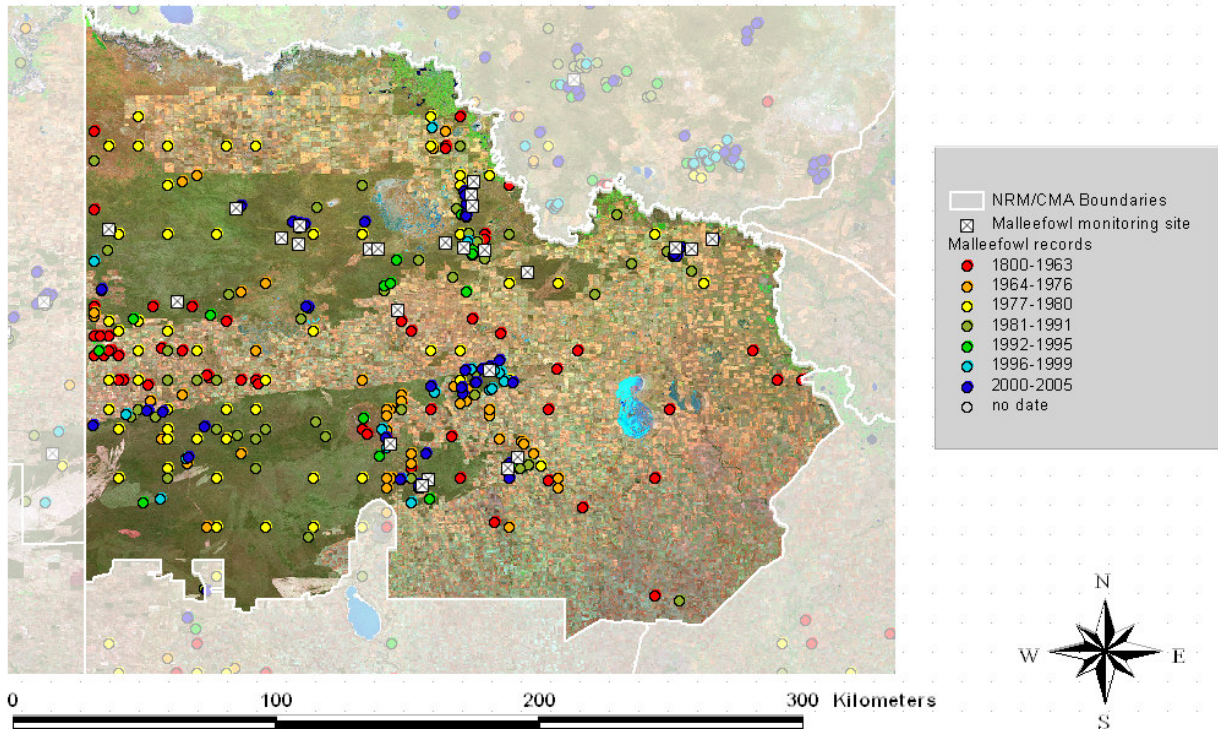
- Malleefowl conservation within the South East region will depend largely on the species persistence in what is now a highly fragmented habitat comprising a series small and isolated reserves and private land. The prognosis for the long term conservation of Malleefowl within these isolated remnants is poor, and the conservation of Malleefowl in the fragmented landscape will ultimately require experimental management (i.e. translocation, habitat links, vegetation manipulation) informed by monitoring.
- Establishing more monitoring sites in isolated remnants would provide useful benchmarks for management and provide a means of assessing the success or otherwise of different approaches. However, finding volunteers to monitor more sites may be limiting.
- Opportunities for new monitoring sites in the South East region include reserves in which Malleefowl have been recorded since 2000 (Gum Lagoon CP, Mt Boothby CP, Carcuma CP) reserves in which Malleefowl were often recorded up until the late 1990s (Bunbury CP, Messent CP, Martin Washpool CP, and on private blocks, most notably south of Mt Rescue CP where there have been numerous recent sightings.
- There is uncertainty in how to reverse the decline of Malleefowl in the Murray Darling Basin region and the species has declined severely despite considerable investments in management. A program of experimental and adaptive management, informed by monitoring and coordinated across

multiple regions, is recommended in order to develop reliable and effective management practices.

Current Monitoring Site details

Site#	Site_name	Location and tenure	Area	1st data	Seasons (to 2005/6)	Mounds ¹ (2005/6)	Avg. Active ² (to 2005/6)	Patch size km ²	Trend (to 2006/7)
S13	Mount Scott	Mount Scott CP	3.1	1992	4	43	3.1	20	0
S48	Ngarkat 2	Ngarkat CP	4.0	2001	1	8	0	>1000	
S49	Ngarkat 3	Ngarkat CP	4.0	2001	1	18	1	>1000	
S65	Coorong (Loop Rd)	Coorong NP	4.9	1996	9	26	3.1	5.5	?-ve
			16		15	95	7.2		

14. VIC Mallee CMA



Malleefowl records

Historically, Malleefowl were widely distributed across the Mallee CMA region. Most records before 1963 were from areas that are now cleared and no longer support the species. Malleefowl have persisted in the remaining blocks of habitat almost all of which is now reserved as either National Park or Flora and Fauna Reserve. There are few recent sightings from south-western portion of the Big Desert and in the north western Sunset Country where Malleefowl have previously been recorded and this might suggest a decline in these areas.

Table 16. The number of Malleefowl records (to 2005) in the Mallee CMA sorted by time periods that contain similar numbers of records across Australia. Shaded rows indicate a total of less than ten records in an NRM. Numbers are indicative only and may contain records duplicated across different databases. Data sources are shown in Table 1.

NRM region	Before 1963	1964-1976	1977-1980	1981-1991	1992-1995	1996-1999	2000-2005	Total
Mallee CMA	107	88	172	63	26	37	71	564
Total Australia	591	569	658	637	536	549	612	4156

Monitoring sites

- There are 25 Malleefowl monitoring sites in the Mallee CMA Region, and these provide a good coverage of major habitat patches, with the exception of the western Big Desert which is not represented at all.

- The VMRG conducts Malleefowl monitoring at all sites in the Mallee CMA. Detailed reports are produced by the VMRG on the monitoring each year.
- Malleefowl monitoring involves inspections of over 900 mounds each year of which 94 are typically active (including drought years). Monitoring sites cover a total area of over 100 km².
- In the Mallee region each year, monitoring provides about ten times more breeding records of Malleefowl than incidental sightings of the species are added to wildlife atlases.
- Monitoring methods have not changed since the early 1990s and are consistent with national standards.
- Data on the occurrence of foxes/dogs, rabbits, kangaroos, goats, and emus at mounds is also collected and provides measures of the trends in abundance of these animals.

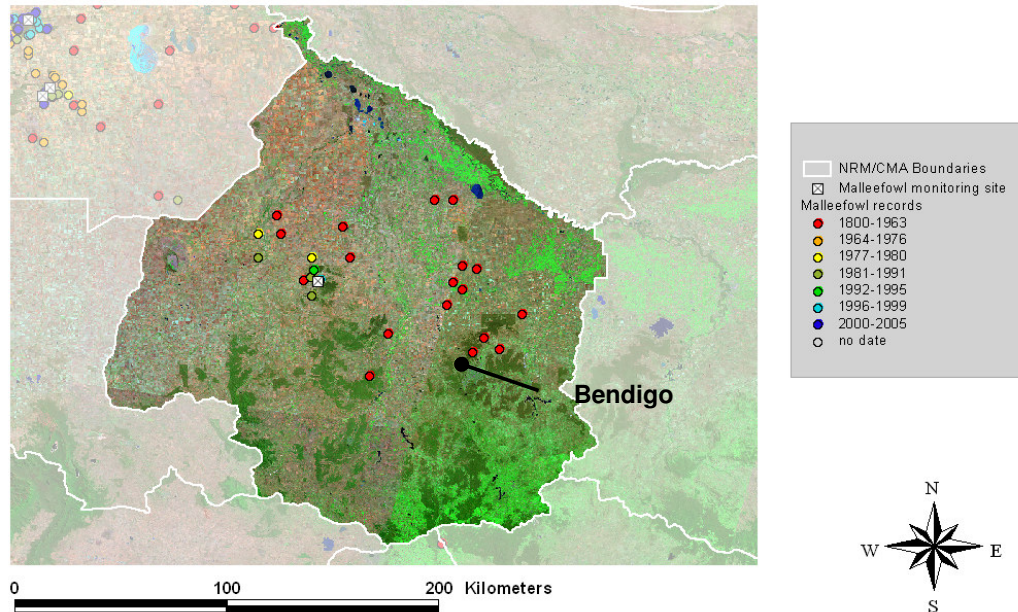
Site details

Site#	Site_name	Location and tenure	Area	1stdata	Seasons (to 2006/7)	Mounds ¹ (2006/7)	Avg. Active ² (to 2006/7)	Patch size km ²	Trend (to 2006/7)
v01	Dattuck	Wyperfeld NP	6.0	1995	12	80	1.2	>1000	0
V02	Torpey's	Wathe FFR	4.0	1963	21	57	5.7	61	-ve
V03	Wathe SW	Wathe FFR	3.2	1986	19	91	8.6	61	0
V04	Bronzewing	Bronzewing FFR	5.4	1989	17	108	11.4	150	0
V05	Colignan	Hattah-Kulkyne NP	4.0	1996	10	14	1.9	>1000	-ve
V07	Annuello	Annuello FFR	3.9	1986	17	35	0.9	389	?-ve
V08	Powerline	Murray Sunset NP	4.0	1996	11	17	1.5	>1000	-ve
V09	Mt Hattah	Murray Sunset NP	4.0	1996	11	14	0.9	>1000	-ve
V10	1 Tree BNT	Murray Sunset NP	4.0	1996	6	3	0	>1000	
V11	Mopoke	Murray Sunset NP	4.0	1996	11	16	1.2	>1000	0
V12	Pheeney's	Murray Sunset NP	4.0	1991	14	27	1.9	>1000	?-ve
V13	Bambill	Murray Sunset NP	4.0	1994	13	39	1.3	>1000	0
V14	Menzies	?	3.8	1991	14	32	8.6	4	0
V15	Wandown	Wandown FFR	19.0	1969	19	87	21.8	21	+ve
V16	South Bore	Murray Sunset NP	4.0	1995	12	47	0.7	>1000	-ve
V17	One Tree Plain	Murray Sunset NP	4.0	1993	11	37	0.9	>1000	-ve
V18	Washing Machine	Murray Sunset NP	4.0	1993	14	27	1.1	>1000	-ve
V19	Underbool	Murray Sunset NP	4.0	1993	14	23	0.5	>1000	-ve
V20	Lowan	Wyperfeld	2.8	1989	16	60	4.6	>1000	-ve
V21	Dumosa	Hattah-Kulkyne NP	4.0	1992	15	40	3.4	>1000	-ve
V22	Denning		5.4	1992	13	18	1.1	5	-ve
V23	Moonah	Wyperfeld NP	4.0	1984	14	67	8.1	>1000	-ve
V26	Hattah Tracks	Hattah-Kulkyne NP	00	1997	5	22	2.8	>1000	-ve
V27	O'Brees		2.9	2002	5	20	3.4	16	0
V30	Hattah South/Lendrook	Hattah-Kulkyne NP	4.0	2004	3	11	0	>1000	
			101		320	914	93.5		

¹ May include mounds that are outside the strict boundaries of the original site

² Excluding mounds outside the strict boundaries of the original site, and including unfavourable drought seasons

15. VIC Central North CMA



Malleefowl records

Historically, Malleefowl were distributed across a wide area in the North Central CMA region, particularly in north of Bendigo and in the vicinity of Wedderburn and Charlton. Most records were from areas that are now cleared and no longer support the species, notable exceptions being the Wychitella area where the species persists in low numbers, and the Bendigo Whipstick where the species has not been recorded since 1936 (most records date from the 1800s). Currently, the Malleefowl is only thought to exist in the Wychitella Flora and Fauna Reserve where, despite the lack of official records, the birds were known to breed as recently as 2007.

Table 17. The number of Malleefowl records (to 2005) in the North Central CMA sorted by time periods that contain similar numbers of records across Australia. Numbers are indicative only and may contain records duplicated across different databases. Data from the National Malleefowl Recovery Plan (2006).

NRM region	Before 1963	1964- 1976	1977- 1980	1981- 1991	1992- 1995	1996- 1999	2000- 2005	Total
North Central	20	-	2	3	1	4	-	30
Total Australia	591	569	658	637	536	549	612	4156

Monitoring sites

- There are three Malleefowl monitoring sites in the North Central CMA Region and another in the process of being established. The Wedderburn Conservation Management Network and VMRG conduct Malleefowl monitoring at all sites in the North Central CMA Region and produce detailed reports on the monitoring each year.
- Surveys of the Wychitella block were undertaken in the 1960s, 1970s, 1980s and in 2006 and clearly show that a major decline in Malleefowl abundance

has occurred. Malleefowl are, however, still known to occur and breed in the Wychitella Flora and Fauna Reserve and surrounding uncleared freehold.

- Malleefowl monitoring currently involves the inspection of 36 mounds each year at the three established sites within the North Central CMA, over an area of about 12 km².
- Monitoring methods are consistent with national standards.
- Data on the occurrence of foxes/dogs, rabbits, kangaroos, goats, and emus at mounds is also collected and provides some measure of the trends in abundance of these animals.
- A partnership between the Wedderburn Conservation Management Network and DSE has focussed on improving management of the Wychitella Flora and Fauna Reserve with Malleefowl as a primary focus.

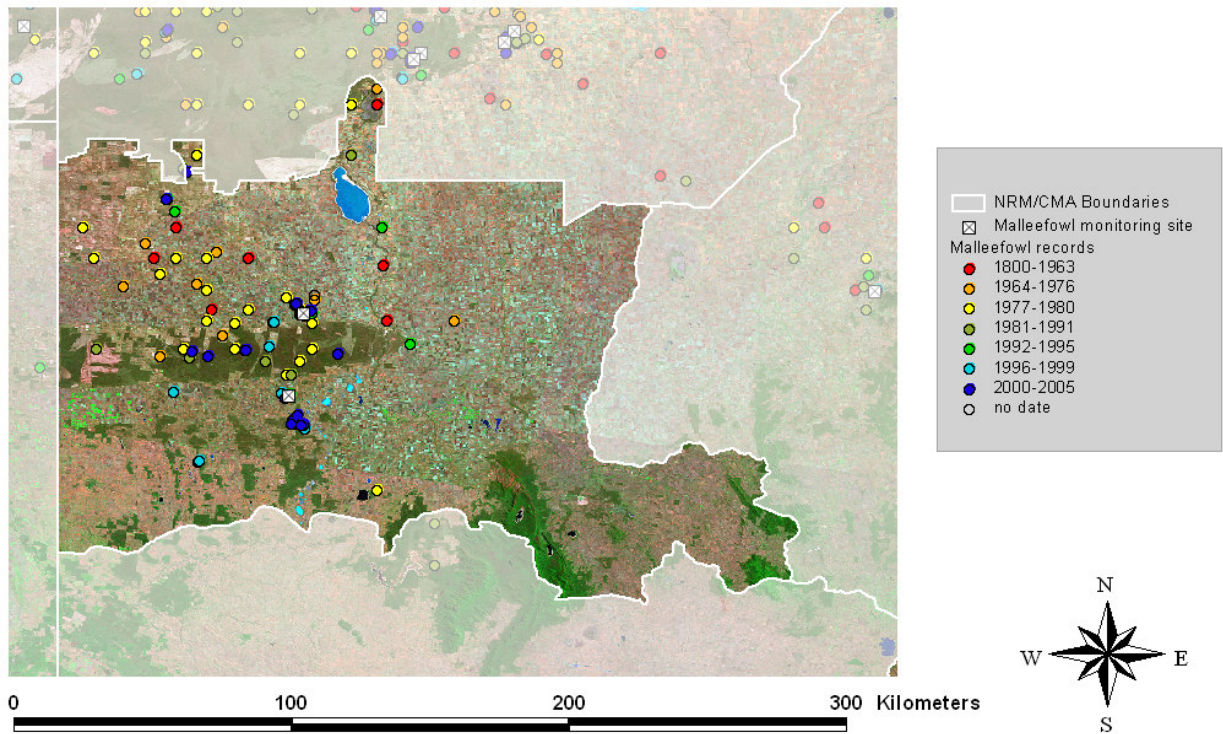
Priorities for new monitoring sites

- Continue monitoring.
- Apart from the Wychitella Reserve, there are no other locations in which Malleefowl have been recorded in the past 70 years and no other opportunities for monitoring.
- There is uncertainty in how to manage Malleefowl populations and a program of experimental and adaptive management, informed by monitoring and coordinated across multiple regions, is recommended in order to develop effective management practices.

Current Monitoring Site details

Site#	Site_name	Location and tenure	Area	1st data	Seasons (to 2006/7)	Mounds ¹ (2006/7)	Avg. Active ² (to 2006/7)	Patch size km ²	Trend (to 2006/7)
V29	Wedderburn			2004	3	9	0.0	40	
V31	Skidders Flat			2004	3	11	0.0	40	
V32	Wychitella			2006	1	16	0.0	40	
V33	Korong Vale								

16. VIC Wimmera CMA



Malleefowl records

Historically, Malleefowl were distributed across a wide area in the western Wimmera CMA region. Most records before 1980 were from the north of the Little Desert in areas that are now cleared and no longer support the species. Malleefowl have persisted in the Little Desert and in some nearby habitat patches, at Mount Arapiles-Toooan State Park, and also in the far north of the region near the Big Desert.

Table 18. The number of Malleefowl records (to 2005) in the Wimmera CMA sorted by time periods that contain similar numbers of records across Australia. Numbers are indicative only and may contain records duplicated across different databases. Data from the National Malleefowl Recovery Plan (2006).

NRM region	Before 1963	1964- 1976	1977- 1980	1981- 1991	1992- 1995	1996- 1999	2000- 2005	Total
Wimmera	13	22	42	11	10	24	33	155
Total Australia	591	569	658	637	536	549	612	4156

Monitoring sites

- There are only two Malleefowl monitoring sites in the Wimmera CMA Region. The VMRG conducts Malleefowl monitoring at both sites in the Wimmera Region and produces detailed reports on the monitoring each year.
- The Kiata monitoring site is located within the Kiata Lowan Sanctuary, a small projection of land north of the Little Desert that was reserved for Malleefowl in 1955. Although breeding Malleefowl were apparently

common at the site at that time (up to 10 pairs; K. Hatley, pers. comm.), by 1999 when the monitoring site was established none of the 20 mounds found were active (one mound was active within the reserve, but it was located just outside the monitoring site), and none have been recorded as active since then. It is possible that breeding numbers were boosted by local land clearing in the 1950s and 1960s (K. Hatley, pers. comm.). Nonetheless, a steep decline in Malleefowl breeding numbers appears to have occurred at this site.

- The Nurcong site is situated 6 km south of the Little Desert and separated from it by cleared land. However, the Nurcong site is connected to Mount Arapiles-Tooan State Park where Malleefowl have been sighted in recent years. The site has only been monitored since 2003, and only 12 mounds have been monitored, although up to six mounds have been active in some years suggesting a healthy Malleefowl population at this site. The site has not yet been completely searched.
- Malleefowl monitoring currently involves the inspection of 32 mounds each year at the two sites within the Wimmera CMA. Monitoring sites cover a total area of about 5 km².
- Monitoring methods are consistent with national standards.
- Data on the occurrence of foxes/dogs, rabbits, kangaroos, goats, and emus at mounds is also collected and provides some measure of the trends in abundance of these animals.

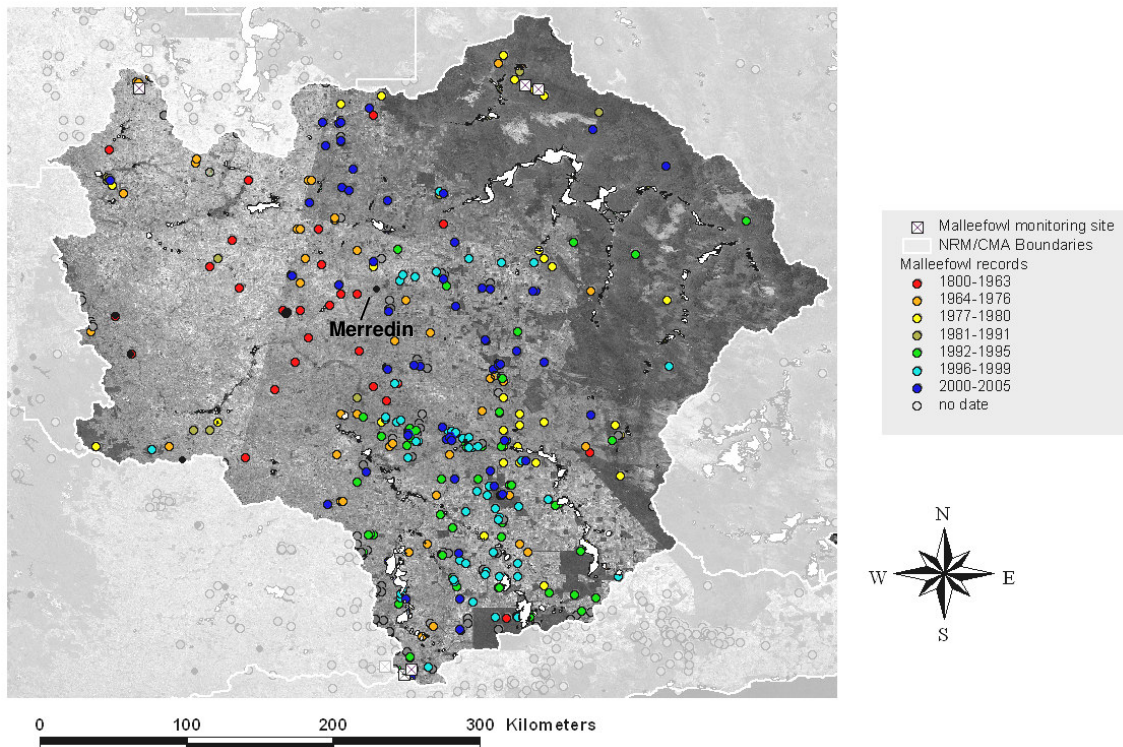
Priorities for new monitoring sites

- The main body of the Little Desert is not represented by Malleefowl monitoring sites, although there is no doubt that Malleefowl still occur in suitable vegetation within the reserve. At least two monitoring sites would be beneficial.
- Outside the Little Desert, opportunities for monitoring sites also occur at Mt Arapiles Tooan State Park, on some private remnants, and in the far north of the Wimmera region on the edge of the Big Desert (see Mallee Region).

Current Monitoring Site details

Site#	Site_name	Location and tenure	Area	1st data	Seasons (to 2006/7)	Mounds ¹ (2006/7)	Avg. Active ² (to 2006/7)	Patch size km ²	Trend (to 2006/7)
V24	Kiata	Kiata Lowan Sanctuary, Little Desert NP	2.1	1999	6	20	0.0	xx	-
V28	Nurcoung	Between Little Desert NP and Mt Arapile Tooan State Park, xx	3.0	2003	3	12	3.0	xx	-
			5.1		9	32	3		

17. WA Avon NRM Region



Malleefowl records

Historically, Malleefowl were recorded over much of the Avon NRM and Malleefowl have been more frequently recorded in the Avon NRM than any other NRM in Australia with the exception of the Mallee CMA in Victoria. Nonetheless, the range of Malleefowl in the Avon NRM has contracted from the western third of the region and over much of this area appears to be locally extinct. This decline reflects clearing history which was especially thorough in the west of the Avon NRM (in the Avon Wheatbelt bioregion) and very few areas of native vegetation remain.

Malleefowl still occur in the eastern parts of the Avon NRM in both the severely fragmented landscapes that comprise the central third of the region (comprising Avon Wheatbelt and Mallee bioregions), and in the uncleared rangelands that comprise the eastern third of the region (Coolgardie bioregion). In recent years, Malleefowl have been most often recorded in the central parts of the region where the species persists in numerous small and mostly isolated remnants of habitat. Malleefowl have been recorded less frequently in the uncleared rangelands, and this probably reflects less suitable habitat and fewer birds as well as lower numbers of observers. Several records since the early 1990s suggest that Malleefowl are probably still widely distributed over these rangelands in low numbers.

Table 19. The number of Malleefowl records (to 2005) in the Avon NRM region sorted by time periods that contain similar numbers of records across Australia. Numbers are indicative only and may contain records duplicated across different databases. Data from the National Malleefowl Recovery Plan (2006).

NRM region	Before 1963	1964- 1976	1977- 1980	1981- 1991	1992- 1995	1996- 1999	2000- 2005	Total
Avon	49	99	59	21	100	97	73	498
Total Australia	591	569	658	637	536	549	616	4156

Monitoring sites

- There are five monitoring sites in the Avon NRM most of which occur at the edges of the region (with the exception of the Merredin site).
- Monitoring involves the inspection of xxx mounds over a total area of about xx 23 km². Monitoring is conducted by NCMPG volunteers (site w01), MPG volunteers (w12 and w15), and by private consultants (w21) for Portman Limited.
- Declines in Malleefowl breeding numbers are apparent at some sites in the Avon NRM, although the monitoring record is patchy and most of the sites have only recently been established.
- Monitoring methods are currently consistent with national standards. In the past not every mound at each site was visited and data was incomplete making some early records difficult to interpret.
- Data on the occurrence of foxes/dogs, rabbits, kangaroos, goats, and emus at mounds is also currently collected and provides some measure of the trends in abundance of these animals.

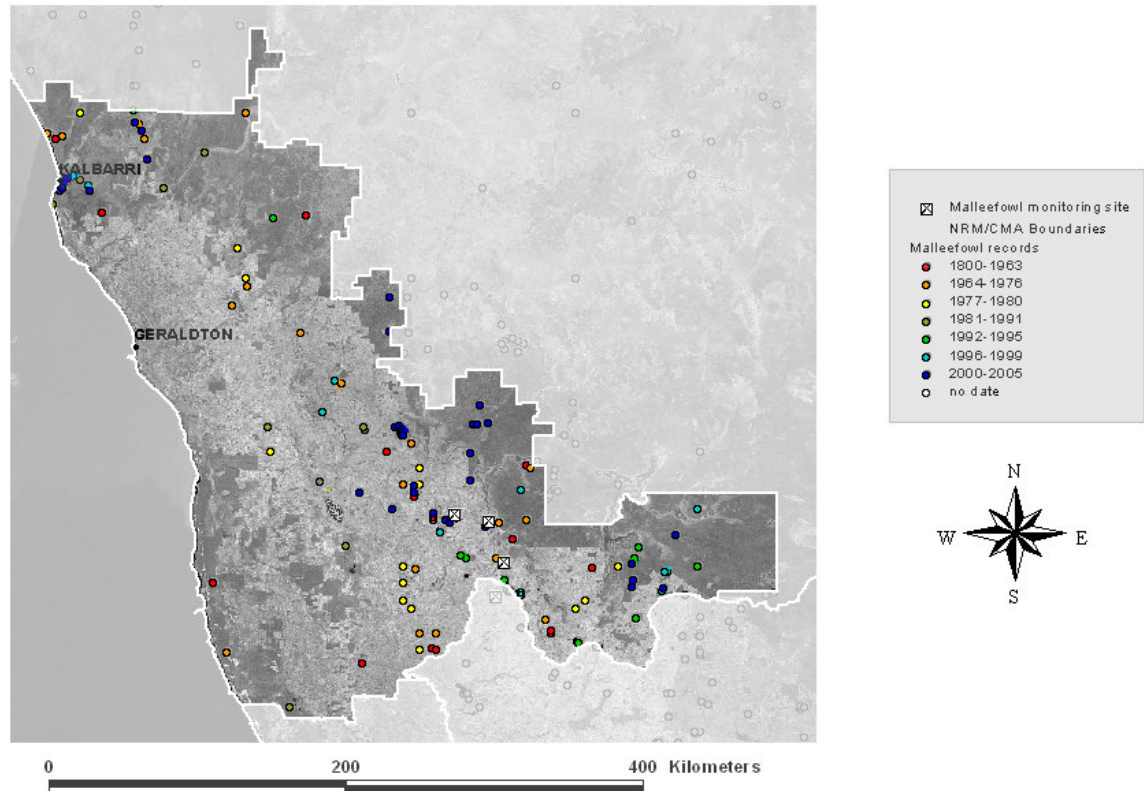
Priorities for Malleefowl monitoring

- Further development of the monitoring system is required to make it more effective, to facilitate the flow of information, and to report the information within regional and national context.
- Malleefowl still occur over much of their original range within the Avon NRM where suitable habitat remains. However, further contractions in the range of the species are likely in the highly fragmented landscapes where recent Malleefowl sightings are most numerous unless steps are taken to link isolated populations.
- Establishing more monitoring sites throughout the species current range in the Avon NRM would provide useful benchmarks for management and provide a means of assessing the success or otherwise of different management approaches.
- There is uncertainty in how to manage Malleefowl populations and a program of experimental and adaptive management, informed by monitoring and coordinated across multiple regions, is recommended in order to develop effective management practices.

Current Monitoring Site details

Site#	Site_name	Location and tenure	Area	1stdata	Seasons (to 2005/6)	Mounds ¹ (2005/6)	Avg. Active ² (to 2005/6)	Patch size km ²	Trend (to 2005/6)
w01	Nugadong	20 km south of Wubin (private property)	400	1995	4		5.7	5.5	-ve
w12	Foster Rd.	15 km north of Ongerup	130	1994	8		6.1	1.3	?-ve
w15	Tieline Rd.	Tieline Road NR, 17 km north of Ongerup	128	1995	1?x		0	1.3	
w17	Mt. Jackson	East of Mt Jackson township		2004?	4?	150		>1000km ²	
w21	Merredin	16 Km South-East Of Merredin	xx	xx	xx	?	?		

18. WA Northern Agricultural NRM Region



Malleefowl records

Historically, Malleefowl were recorded over much of the Northern Agricultural NRM region, especially in the east of the region (Avon Wheatbelt and Yalgoo bioregions). The wheat-belt region has been extensively cleared and the distribution of records suggests a substantial contraction in the range of Malleefowl. In the west of the Northern Agricultural NRM region (Geraldton Sandplains bioregion), Malleefowl records have rarely been recorded with the exception of the Kalbarri and Eurardy Station area to the north where historic and recent records are numerous. Malleefowl have also been recently recorded in the uncleared rangelands in the far east of the Northern Agricultural NRM region on Karara and Lochada Stations (recently acquired by DEC), at Charles Darwin Reserve (Australian Bush Heritage), and Mount Gibson Reserve (Australian Wildlife Conservancy) and on pastoral leases to the east of Lake Moore.

Table 20. The number of Malleefowl records (to 2005) in the Northern Agricultural NRM region sorted by time periods that contain similar numbers of records across Australia. Numbers are indicative only and may contain records duplicated across different databases. Data from the National Malleefowl Recovery Plan (2006).

NRM region	Before 1963	1964- 1976	1977- 1980	1981- 1991	1992- 1995	1996- 1999	2000- 2005	Total
Northern Agricultural	26	33	29	27	15	18	52	200
Total Australia	591	569	658	637	536	549	616	4156

Monitoring sites

- There is currently one monitoring sites in the Northern Agricultural NRM on private property about 40km north of Wubin. Monitoring currently involves the inspection of xxx mounds over a total area of about xx 1.5 km². Monitoring is conducted by NCMPG.
- Monitoring methods are currently consistent with national standards. In the past not every mound at each site was visited and data was incomplete making some early records difficult to interpret.
- Data on the occurrence of foxes/dogs, rabbits, kangaroos, goats, and emus at mounds is also currently collected and provides some measure of the trends in abundance of these animals.
- Several other sites have been searched for Malleefowl mounds within the region and are in the process of being established for routine monitoring, including three sites in the highly fragmented habitat within 50km of Wubin, as well as sites at Charles Darwin Reserve and Eurardy Reserve (Australian Bush Heritage) and Mt Gibson sanctuary (Australian Wildlife Conservancy).

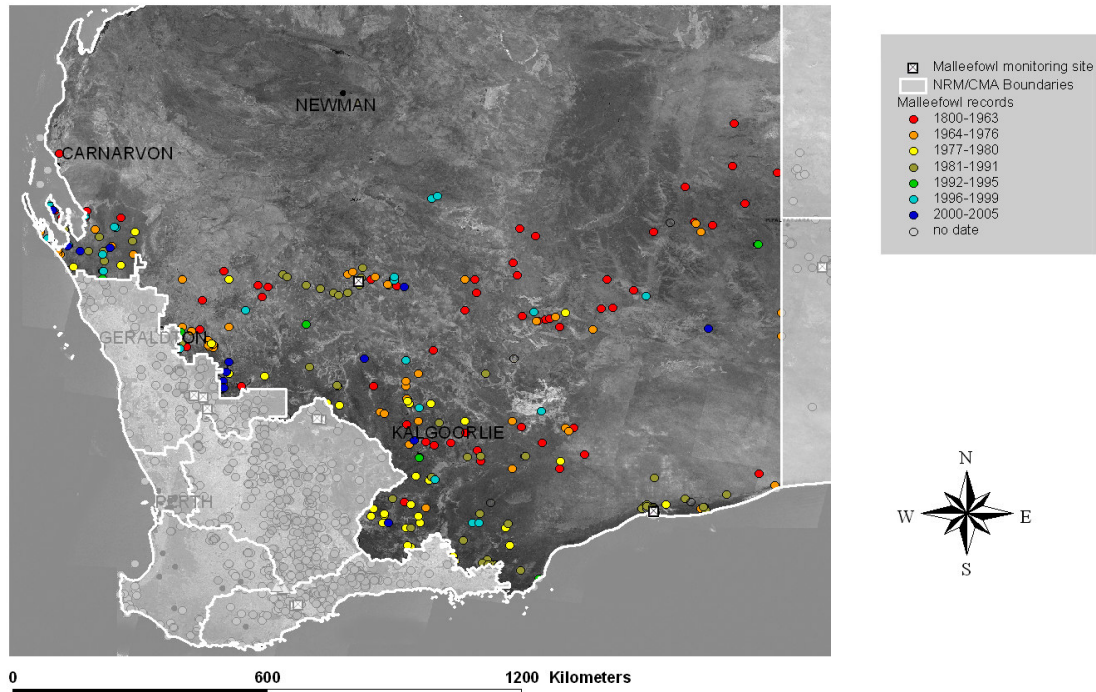
Priorities for Malleefowl monitoring

- Further development of the monitoring system is required to make it more effective, to facilitate the flow of information, and to report the information within regional and national context.
- Further contractions in the range of Malleefowl are likely in the highly fragmented landscapes of the wheat-belt unless steps are taken to link isolated populations.
- Establishing more monitoring sites throughout the species current range in the Northern Agricultural NRM would provide useful benchmarks for management and provide a means of assessing the success or otherwise of different management approaches.
- There is uncertainty in how to manage Malleefowl populations and a program of experimental and adaptive management, informed by monitoring and coordinated across multiple regions, is recommended in order to develop effective management practices.

Current Monitoring Site details

Site#	Site_name	Location and tenure	Area	1stdata	Seasons (to 2005/6)	Mounds ¹ (2005/6)	Avg. Active ² (to 2005/6)	Patch size km ²	Trend (to 2005/6)
w02	Old Well	40 km north of Wubin (private property)??	150	1998	2		3.0	1.5	

19. WA Rangelands NRM Region



Malleefowl records

Historically, Malleefowl were recorded over much of the southern part of the Rangelands NRM region and occurred in all bioregions below the 26th latitude. Malleefowl were recorded as far north as the 24th latitude in the Central Ranges (bordering the NT) and Carnarvon (bordering the coast) bioregions, although these records mostly date from the 1800s and early 1900s. Malleefowl were likely to have been sparsely distributed in suitable habitat and more Malleefowl records have been collected in the rangelands than in any other NRM region in WA apart from the Avon NRM region. Of particular concern is the consistent drop in the number of reports over the past 15 years, suggesting that the species may be declining. However, it also appears that the records are incomplete: the species is known to still occur at several locations at Yeelirrie Station (BHB Billiton Limited) and on the Ngaanyatjarra Lands, although these data are not represented in recent records. Recently (1998) Malleefowl have also been recorded on Earahedy Station (DEC), considerably extending their known range in central WA, and have been reintroduced onto Peron Peninsula where they were thought to have become locally extinct. Other areas in which the species appears to be persisting include the area between Kalbarri and the Peron Peninsula, the Mt Gibson Sanctuary (Australian Wildlife Coinservancy) and Mt Gibson mine site (Mt Gibson Iron Limited), and the vicinity of Eyre Bird Observatory (Birds Australia).

Table 21. The number of Malleefowl records (to 2005) in the Rangelands NRM region sorted by time periods that contain similar numbers of records across Australia. Numbers are indicative only and may contain records duplicated across different databases. Data from the National Malleefowl Recovery Plan (2006).

NRM region	Before 1963	1964- 1976	1977- 1980	1981- 1991	1992- 1995	1996- 1999	2000- 2005	Total
Rangelands (WA)	81	74	58	99	37	32	30	411
Total Australia	591	569	658	637	536	549	616	4156

Monitoring sites

- Monitoring techniques developed in southern Australia in which circumscribed and relatively small areas are thoroughly searched for mounds are not practicable in central Australia where Malleefowl are scarce and highly dispersed.
- Monitoring occurs at Yeelirrie Station (BHP Billiton Limited) and Eyre Bird Observatory (Birds Australia) in Nuytsland Nature Reserve. In each of these areas monitoring involves the inspection of known mounds over a total area of several thousand square kilometres. Monitoring is conducted by the MPG volunteers at Yeelirrie, and the MPG and BA volunteers at Eyre Bird Observatory.
- Irregular monitoring is also occurs on the Ngaanyatjarra Lands where traditional owners revisit known mounds.
- Several other sites have been searched for Malleefowl mounds within the region and are in the process of being established for routine monitoring, including sites at Mt Gibson Sanctuary, Mt Gibson Mine site, Peron Peninsular, and near Kalgoorlie.
- Some data on the occurrence of foxes/dogs, rabbits, kangaroos, goats, and emus at mounds is also collected and provides some measure of the trends in abundance of these animals.

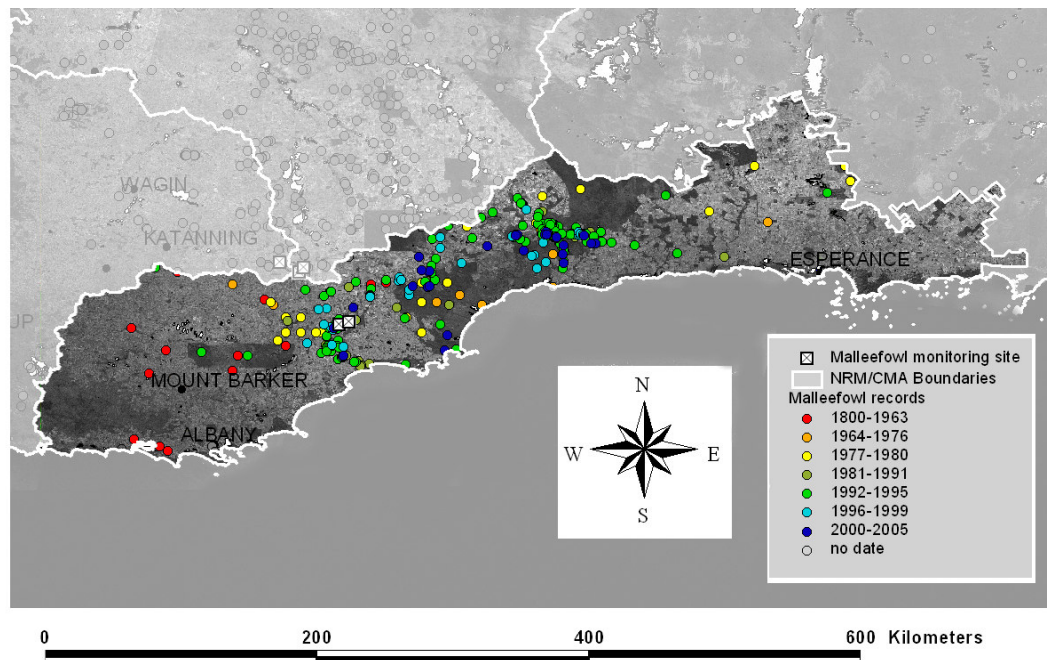
Priorities for Malleefowl monitoring

- Surveys targeting areas in which Malleefowl were previously known but have not been recently recorded would clarify the conservation status of the species in the Rangeland NRM.
- Establishing more monitoring sites would provide useful benchmarks for management.
- Further development of the monitoring system is required throughout the Rangelands NRM region, including Aboriginal Lands, to make the monitoring more effective, to facilitate the flow of information, and to report the information within regional and national context.
- There is uncertainty in how to manage Malleefowl populations and a program of experimental and adaptive management, informed by monitoring and coordinated across multiple regions, is recommended in order to develop effective management practices.

Current Monitoring Site details

Site#	Site_name	Location and tenure	Area	1st data	Seasons (to 2005/6)	Mounds ¹ (2005/6)	Avg. Active ² (to 2005/6)	Patch size km ²	Trend (to 2005/6)
A01	Yeelirrie	Leasehold (BHP Billiton)	>1000	2000	4			>1000	
A02	Eyre Bird Observatory	Nuytsland NR	>1000	??	??			>1000	

20. WA South Coast NRM Region



Malleefowl records

Historically, Malleefowl were recorded over much of the South Coast NRM region, especially in the central parts of the region (Esperance Plains and Mallee bioregions). Malleefowl were rarely recorded on the Jarrah Forest bioregion in the west, although they did occur at its edges near the coast west of Albany (Warren bioregion) until the at least the 1960s, and in Stirling Range NP where they were recorded in the 1990s. The range of Malleefowl has contracted from the west and east of the region and most recent records have been obtained from uncleared remnants such as Fitzgerald NP and surrounding uncleared habitat in the vicinity of Ravensthorpe, and Corackerup and Peniup NR and uncleared habitat along the Pallinup River. Surrounding these areas are smaller and fragmented habitat remnants in which Malleefowl are often recorded.

Table 22. The number of Malleefowl records (to 2005) in the South Coast NRM region sorted by time periods that contain similar numbers of records across Australia. Numbers are indicative only and may contain records duplicated across different databases. Data from the National Malleefowl Recovery Plan (2006).

NRM region	Before 1963	1964- 1976	1977- 1980	1981- 1991	1992- 1995	1996- 1999	2000- 2005	Total
South Coast	25	12	28	26	199	51	31	372
Total Australia	591	569	658	637	536	549	616	4156

Monitoring sites

- There are two monitoring sites in the South Coast NRM and these are located in the Corackerup NR and Peniup NR.

- Monitoring currently involves the inspection of xxx mounds over a total area of about 6 km². Monitoring is conducted by MPG.
- Monitoring methods are currently consistent with national standards. In the past not every mound at each site was visited and data was incomplete making some early records difficult to interpret.
- Data on the occurrence of foxes/dogs, rabbits, kangaroos, goats, and emus at mounds is also currently collected and provides some measure of the trends in abundance of these animals.

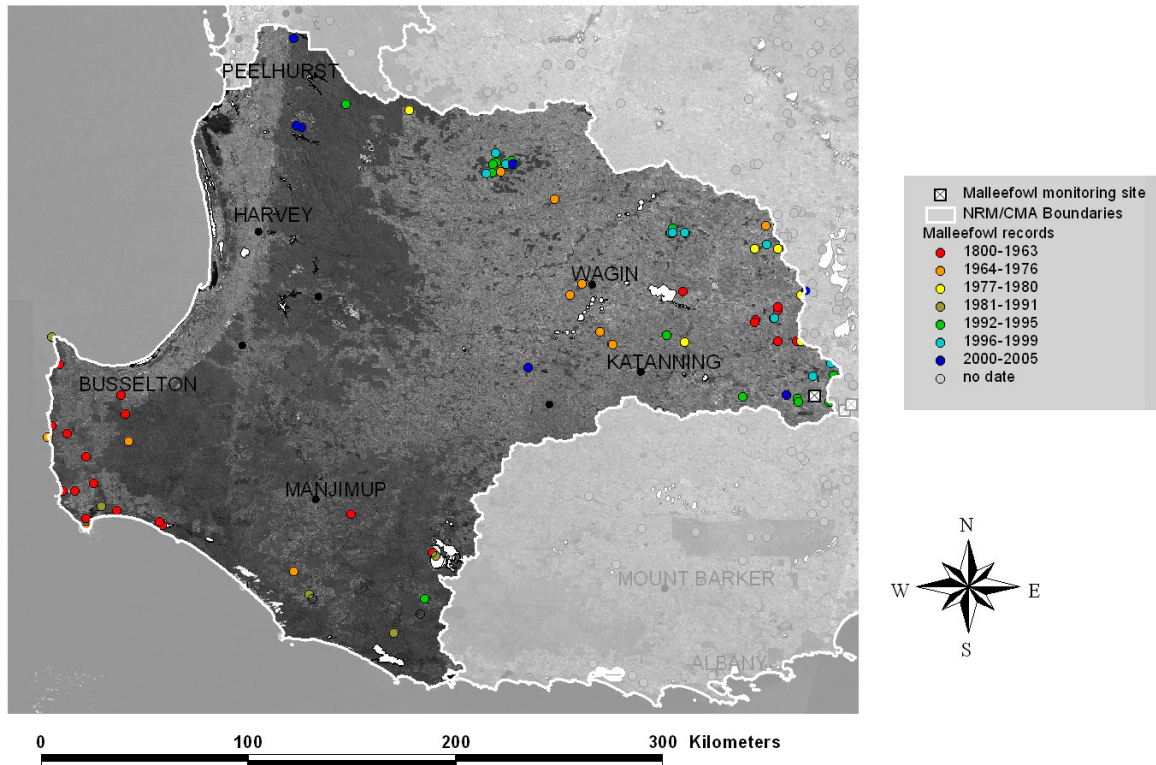
Priorities for Malleefowl monitoring

- Further development of the monitoring system is required to make it more effective, to facilitate the flow of information, and to report the information within regional and national context.
- Further contractions in the range of Malleefowl are likely in the highly fragmented landscapes unless steps are taken to link isolated populations.
- Establishing more monitoring sites throughout the species current range would provide useful benchmarks for management and provide a means of assessing the success or otherwise of different management approaches.
- There is uncertainty in how to manage Malleefowl populations and a program of experimental and adaptive management, informed by monitoring and coordinated across multiple regions, is recommended in order to develop effective management practices.

Current Monitoring Site details

Site#	Site_name	Location and tenure	Area	1stdata	Seasons (to 2005/6)	Mounds ¹ (2005/6)	Avg. Active ² (to 2005/6)	Patch size km ²	Trend (to 2005/6)
W11	Corackerup	Corackerup NR	300	1993	9	xx	4.9	61	-ve
W13	Peniup	Peniup NR	300	1995	10	xx	2.2	80	-ve

21. WA South West NRM Region



Malleefowl records

Malleefowl were once widespread in the South West NRM region, although their range has contracted markedly, and the number of records has declined, and there are few locations at which the species has been recorded in the past decade. Most records of Malleefowl were from areas that have been extensively cleared, particularly the east of the region (Mallee and Avon Wheatbelt bioregions) which is almost completely cleared but where Malleefowl persist in a few small and isolated remnants, the largest being the Dryandra Woodland (Lol Gray, Highbury and Montague State forests) where Malleefowl still occur but were probably never common. Malleefowl also occurred the far south-west of the region near the coast between Cape Naturaliste to Point D'Entrecasteaux (Warren bioregion) where they were frequently recorded in the early 1900s but have since declined and may be locally extinct. Several records from the 1970s and 1980s suggest that the species persisted until at least this time, the most recent record being from Cape Naturaliste in 1987.

Malleefowl were also occasionally recorded from the karri forests north-west of Walpole as recently as the early 1990s, although these tall and wet forests would not seem to be suitable habitat for the species. Malleefowl have also recently been recorded at several locations in the northern Jarrah Forest bioregion north of Dwellingup and a small and scattered population probably occurs in this area.

Table 23. The number of Malleefowl records (to 2005) in the South West NRM region sorted by time periods that contain similar numbers of records across Australia. Numbers are indicative only and may contain records duplicated across different databases. Data from the National Malleefowl Recovery Plan (2006).

NRM region	Before 1963	1964- 1976	1977- 1980	1981- 1991	1992- 1995	1996- 1999	2000- 2005	Total
South West	47	14	13	12	19	11	6	122
Total Australia	591	569	658	637	536	549	616	4156

Monitoring sites

- There are two monitoring sites in the South West NRM region and these are located at the western edge of the region near Ongerup (Hills monitoring sites), and in the Dryandra Woodland.
- Monitoring at the Hills site is conducted by MPG and involves the inspection of xxx mounds over a total area of 1.5 km². Monitoring methods at Hills are consistent with national standards, although in the past not every mound was visited and data was incomplete making some early records difficult to interpret.
- Monitoring at Dryandra Woodland is conducted by DEC and involves the systematic recording of sightings of Malleefowl along standard transects used to monitor other species. This method differs from the national monitoring standard, but it is a suitable and appropriate method given the very low breeding density of Malleefowl at the site.
- Data on the occurrence of foxes/dogs, rabbits, kangaroos, goats, and emus at mounds is also currently collected at both Hills and Dryandra and provides some measure of the trends in abundance of these animals.

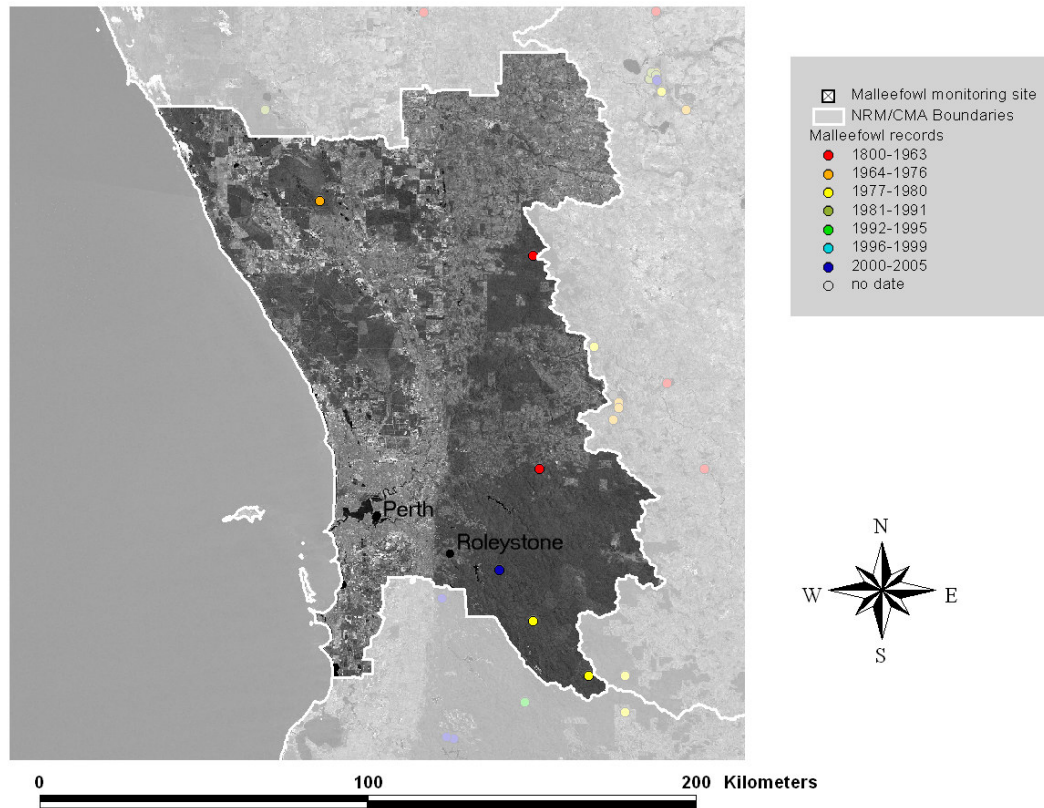
Priorities for Malleefowl monitoring

- Further development of the monitoring system is required to make it more effective, to facilitate the flow of information, and to report the information within regional and national context.
- Further contractions in the range of Malleefowl are likely in the highly fragmented landscapes unless steps are taken to link isolated populations.
- Establishing more monitoring sites throughout the species current range would provide useful benchmarks for management and provide a means of assessing the success or otherwise of different management approaches.
- There is uncertainty in how to manage Malleefowl populations and a program of experimental and adaptive management, informed by monitoring and coordinated across multiple regions, is recommended in order to develop effective management practices.

Current Monitoring Site details

Site#	Site_name	Location and tenure	Area	1stdata	Seasons (to 2005/6)	Mounds ¹ (2005/6)	Avg. Active ² (to 2005/6)	Patch size km ²	Trend (to 2005/6)
w14	Hills	25 km NW of Ongerup; private property	150	1995	3	9	1.3	1.5	?-ve
xx	Dryandra	Dryandra Woodland; State forest	na	xx	xx	na	na	281	?-ve

22. WA Swan NRM Region



Malleefowl records

Malleefowl have only rarely been recorded in the Swan NRM region. Most records have been from the northern Jarrah Forest bioregion, and two recent records within 15 km of Roleystone suggest that a small and scattered population may still occur in this area (one of these records occurred just over the boundary with the South West NRM region).

Table 24. The number of Malleefowl records (to 2005) in the Swan NRM region sorted by time periods that contain similar numbers of records across Australia. Numbers are indicative only and may contain records duplicated across different databases. Data from the National Malleefowl Recovery Plan (2006).

NRM region	Before 1963	1964- 1976	1977- 1980	1981- 1991	1992- 1995	1996- 1999	2000- 2005	Total
Swan	3	3	3	-	-	-	1	10
Total Australia	591	569	658	637	536	549	616	4156

Monitoring sites

- There are no monitoring sites in the Swan NRM region and no obvious sites at which regular monitoring might be conducted.

Priorities for Malleefowl monitoring

- Current records of Malleefowl within Swan NRM region should be solicited, especially in the forests and woodlands of the Darling Ranges where it is possible that Malleefowl may persist in low numbers.