DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

"WESTERN SHIELD" - BRINGING BACK OUR WILDLIFE

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BACKGROUND

Over the past 100 years, mammals have suffered an enormous decline in Australia, including Western Australia. Some species are extinct, some have disappeared from the mainland but remain on a few offshore islands, and some remain only on the mainland where they are threatened with extinction (Table 1). This is the greatest extinction and decline of mammals in modern times anywhere in the world. This massive extinction and decline is, except where habitat has been destroyed by clearing, almost entirely confined to 'Critical Weight Range (CWR)' mammals; those that have mean adult body weight of between 35 g and about 8 000 g. Feral predators have been implicated as a major cause. Some other Western Australian animal species have also been affected by feral predators and have declined - ground nesting birds such as the malleefowl and western ground parrot, pythons such as the carpet python and woma python, and other large reptiles such as the western swamp tortoise and western spiny-tailed skink.

Western Australia has retained a greater number of threatened mammal species than most other States. Some species that are extinct on the mainland still occur on some WA Islands and several species that once occurred across southern Australia remain only in the south west of WA. Pioneering research by CALM scientists has shown that, for many species, the effective control of the European Red Fox leads to a recovery of population abundance and an increase in range. Fox control also allows the re-introduction of species into areas of their former range.

However, research has also shown that there is an interaction between introduced predators (dingo, fox and feral cat), particularly in drier parts of the State. In the Gibson Desert, the Desert Dreaming project showed that dingo and fox control resulted in a significant increase in feral cat abundance and that cats replaced foxes as effective predators of CWR mammals. At Karroun Hill Nature Reserve, the re-introduction of numbats has been affected by an increase in cats; however, numbats have persisted in low numbers in the densest vegetation.

Feral cats are found throughout Western Australia. They are particularly well adapted to open, sandy country and are most abundant in arid and semi-arid areas. Although they persist in low numbers in areas of dense vegetation, there is no evidence that suggests any increase in abundance following fox control in the higher rainfall areas of the south west of the State leads to any problems with native prey species. Indeed, fox control has been demonstrated to be a most effective method of recovering CWR mammals, as well as some other threatened species, in the south west.

CURRENT FOX CONTROL

Fox control, achieved through baiting with dried meat baits containing 4.5 mg of 1080, is now a routine method of conserving threatened CWR mammals in the south west of Western Australia as well as in some areas in the arid zone. Fox control is being carried out as part of several research projects, as part of the implementation of threatened species recovery plans, as part of CALM District operations to conserve mammals on CALM-managed public land, and via Operation Foxglove, which aims to control foxes over an area of more than 500 000 ha of State forest and conservation reserves in the northern jarrah forest.

An imperative of fox control is that, once commenced, it must continue until a better fox control technique becomes available; otherwise fox numbers will quickly build up and prey species — the native animals — will again become threatened or disappear; an investment of resources over many years can be quickly lost. Research into better techniques of fox control is underway through the Cooperative Research Centre for the Control of Vertebrate Pest Populations. CALM is a partner in this Centre. This research is long term and it is likely that baiting with 1080 will be necessary for the next decade, at least.

Funding for current fox control projects comes from a variety of sources. Funding for some projects does not have sufficient medium to long term security (Table 2). Most District operations are funded on an annual basis, many of the research projects are now completed or are due for completion in 1996/97. Of the several million hectares of CALM-managed land that contains fauna susceptible to fox predation, only 900,000 ha is currently baited.

THE VISION

The fauna of south western Australia has been severely fragmented. At the community level, many ecological communities have been virtually destroyed. At the species level some animals are extinct, some have been lost from the region and many others are endangered, surviving only as relict populations. The CWR mammals have been most affected. Almost all of this has happened during this century. However in the last decade CALM has turned the tide. We have been successfully recovering the endangered species. Now we have the ability and the will to reconstruct the fauna (excepting the species that are totally extinct). In doing so we will be rescuing our heritage, re-starting the ecological processes that were driven by the "lost" fauna, and setting Western Australia at the forefront of fauna conservation on a global scale.

Ecological knowledge of threatened species has increased enormously as a result of the many scientific projects that have taken place in recent years. Scientific research into the causes of the extinctions and operational fox control are now both sufficiently advanced for a major coordinated program of fox control and animal re-introductions to commence. Such a program will lead to the reconstruction, as far as is possible, of much of the original fauna of the south west of Western Australia, and ultimately, the rest of the State. For the first time in many decades, people will again be able to see almost extinct mammals, such as the Western Barred Bandicoot and Boodie, without having to travel to remote, fragile island nature reserves. Other threatened species, such as Western Ringtail Possums and Malleefowl should also increase in abundance.

"Western Shield" will lead to a major improvement in the conservation status of many animal species. It will dovetail with many other Western Australian nature conservation and economic initiatives — initiatives such as Landcare (embracing better management of remnant vegetation), and ecotourism and environmental education, including the Hills Forest and *Landscope* Expeditions. Spotlighting expeditions to view the south west's native mammals can become a major tourist attraction, adding a further draw card for visitors to the State. Additional fox control will benefit farmers on adjoining agricultural lands through increased lamb survival and more effective and cheaper fox control will be possible on a regional scale.

In the largely agricultural south west of the State, where the great majority of the land is privately owned, the success of virtually all conservation programs, including the control of feral predators and the maintenance of remnant vegetation, will depend upon the support and involvement of landholders. Coordinated community programs to control feral predators have the potential to eliminate, or greatly reduce, target species, and so result in larger, more visible populations of threatened species over entire regional areas. These results provide great benefits both for nature conservation and for the land holders themselves.

Further development of fox control in Western Australia will follow these principles:

1. Additional fox control projects will be based on a system of Fauna Reconstruction Sites (FRS) and Species Recovery Sites (SRS) (CALM Policy Statement No 29) designed to provide protection for existing threatened mammals and to allow the re-introduction of species that are locally extinct. Fauna reconstruction sites are not only an effective means of achieving nature conservation; they are also the most cost-effective means of doing so. Costs for baiting, fire management and measuring species density will be minimised when many species are being managed in the one area.

2. Current fox control projects will be reviewed and those that are clearly beneficial to threatened species will be provided security of funding.

3. The involvement of local communities in fox control, and in reconstructing the fauna, will be promoted and facilitated, with the aim of eventual joint community / CALM ownership of "Western Shield".

4. With some special exceptions, widespread fox control will be limited to areas of the south west with an annual mean rainfall greater than 350 mm, where cats are not expected to present a significant problem. The 350 mm rainfall isohyet is set as a guide only; areas outside it may be considered for fox control if their vegetation is of a type in which cats are judged likely to have little effect on native prey species, and areas within it may not be suitable for species recovery.

5. Translocations will take place only after the approval of Recovery Plans or Interim Recovery Plans for the threatened species involved, and the approval and funding of Translocation Proposals, as laid down in CALM Policy Statement No. 29.

IMPLEMENTING THE VISION

Fox control must be outcome-oriented. The aims of fox control in Western Australia are:

1. To conserve those elements of the Western Australia fauna in that are declining because of fox predation.

2. To reduce fox density on conservation lands and private property in Western Australia to a level that will allow the reconstruction of fauna that has become locally extinct because of fox predation.

3. To involve rural communities in fox control and in achieving the first two aims.

These aims will be extended to include feral cats once control techniques have been developed.

"Western Shield" has the following objectives:

South West

A network of Fauna Reconstruction Sites and Species Recovery Sites is proposed for the south west that will ensure both the conservation of currently existing threatened mammals and the reconstruction, as far as is possible, of the original mammal fauna. Species Recovery Sites will complement the system of Fauna Reconstruction Sites, allowing particular mammal species to be conserved in areas that are either too small or have an insufficient range of habitats for the reconstruction of the original fauna, or where the special needs of Critically Endangered species take priority. Community involvement and ownership will be facilitated.

Objectives are:

- Undertake effective fox control on all designated species recovery sites and fauna reconstruction sites in the south west (> 350 mm average rainfall) by the end of 1997.

- Demonstrate the effectiveness of fox control, through monitoring the response of native species, at species recovery sites and fauna reconstruction sites by 2002.

- Translocate 13 species to 17 reconstruction sites and 25 species recovery sites by 2000.

- Involve local communities in all possible aspects of "Western Shield" through the appointment, from the rural community, of a coordinator who will promote fox baiting, advise and train landholders on methods of baiting, on ways of locating and monitoring threatened animals and other related issues.

Table 3 shows proposed Fauna Reconstruction Sites and Species Recovery Sites in the south west and the animal species that require protection and/or that will be re-introduced. It also shows the number of islands on which each these species occur in the south-west. It is emphasised that re-introductions shown in Table 3 are indicative only; they will not be confirmed until Translocation Proposals are developed, refereed and approved. Not all re-introductions shown will necessarily take place in the short term; for example, it may not be wise to introduce a predator like the chuditch into an area where natural prey, such as numbats, are still establishing.

François Péron National Park, and the adjacent areas of Peron Peninsula where Project Eden is underway, is outside the 350 mm rainfall isohyet and encompasses fairly open sandy country. This is a special project involving the experimental control of feral cats as well as foxes and, if successful, will provide part of the framework for the extension of introduced predator control programs to areas of the arid zone.

Table 4 shows the Priority List Mammals and other mammal species that require protection from foxes and their occurrence in the proposed system of Fauna Reconstruction Sites and Species Recovery Sites.

Community fox control coordinator

The community fox control coordinator will promote and build on the successful model used over the last four years by the Malleefowl Preservation Group near Gnowangerup. This project is based on an application CALM made to the Commonwealth's Feral Pests Program, which was not successful.

The objectives of this project are to improve the status of threatened species and other native fauna on private land throughout the WA Wheatbelt by:

(i) achieving a wide level of support in rural communities, especially among landholders, for the concept of conserving populations of threatened species and for CALM's programs set up to achieve this aim.

(ii) establishing the control of feral predators as a standard farm operation for landholders whose properties: have populations of threatened species; contain areas of remnant native vegetation; or are adjacent to reserves for the conservation of flora and fauna, concentrating on areas adjacent to designated as FRS or SRS.

(iii) ensuring coordination between individual landowners, shires, catchment groups and regional groups to achieve the most effective result from control programs for feral predators.

Progress towards these objectives will be readily measurable by the number of property owners and community groups (including shire councils), incorporating appropriate activities into their management schedule; the area of land to which such initiatives are relevant; and the extent to which numbers of ground-frequenting vertebrates, especially those threatened species listed in Table 1, are seen to increase following one or more years of actions initiated by the coordinator.

The proposal is built around the contract employment of Suzanne Dennings, currently secretary of the Malleefowl Preservation Group and the prime mover in most of the successes of that Group.

Funding for year 1 of the project totals $101,500; that for years 2 and 3 is estimated to be $93,500. The project design envisages that of these totals, community groups will contribute field assistance worth about $11,500 per year. CALM and the APB would contribute $18,500 in supervision, training and advice, leaving a cash injection necessary of $63,500 in years 1, 2 and 3.

Arid / semi-arid zone (< 350 mm rainfall)

Several research and management projects are underway aimed at preventing fox predation of species outside the south west and these will continue and be expanded as appropriate with the eventual aim of allowing arid zone mammals to gain the benefits that result from the control of foxes and cats. Allied with these projects is CALM's feral cat research projects which are aimed at developing effective and safe means of cat control. Areas where foxes are controlled outside the 350 mm rainfall isohyet, in addition to Project Eden, are:

Calvert Range (Black-flanked Rock-wallaby - currently funded by CRA)
Parts of Cape Range National Park (Black-flanked Rock-wallaby, marine turtles)
Dolphin Island and the Burrup Peninsula (Rothschild's Rock-wallaby)
Townsend Ridges (Black-flanked Rock-wallaby).
Karroun Hill Nature Reserve (Numbat - currently funded by ANCA).

In addition, a fox control project is planned for Depuch Island in the Pilbara, to allow the re-introduction of Black-flanked Rock-wallabies from the Calvert Range population.

Cat control research will continue and be expanded in arid areas (see below). Major projects to control cats will be carried out at Peron Peninsula (Project Eden) and at the Montebello Islands (Montebello Renewal).

Objectives are:

- Continue and expand fox control operations and research at sites where native species are near extinction and where cats are unlikely to be a major problem.

- Control cats as through Operation Eden and Montebello Renewa. by 1996.

- Develop effective techniques for integrated fox and feral cat control by 1997.

- Develop a system of Fauna Reconstruction Sites and Species Recovery Sites in the arid zone by 1998.

- Demonstrate the effectiveness of integrated fox and feral cat control in the arid zone by 2000.

- Translocate selected species into arid zone fauna reconstruction sites by 2000.

Kimberley

So far research into the effects of introduced predators on native mammals has been limited to the south west and arid parts of the State. No work has been carried out in the Kimberley, which has a different suite of mammal species. About 65 species of mammals occur in the Kimberley; 28 of these fall within the CWR.

Foxes are generally believed to be absent or sparsely distributed in the Kimberley. However, foxes have been recorded at one time or another in much of the Kimberley. Very little mammal survey work has been carried out in the Kimberley since the 1970s. Even at that time, there was sufficient anecdotal evidence to suggest that a decline in CWR mammals, at least in areas of low to moderate rainfall, was occurring. Evidence from studies in arid areas that a single fox can cause the local extinction of a CWR mammal population gives considerable cause for concern that foxes could be the basis of a decline in Kimberley mammals in the same way as has happened in the south west. It would be disastrous, through complacency, to loose parts of the Kimberley fauna now, when we know how to control foxes.

Objectives are:

- Determine current fox abundance in the Kimberley, particularly in association with remnant populations of CWR mammals by 1998.

- Clarify the conservation status of Kimberley CWR mammals by 1998.

- Control foxes around remnant populations of Kimberley CWR mammals and measure the prey response, thus determining if the fox is causing decline of Kimberley mammals and other animals, by 2000.

The high rainfall part of the north west Kimberley, centred on the Prince Regent Nature Reserve, is the only part of mainland Western Australia that is believed to have an intact mammal fauna. However, the mammal fauna of this area has not been surveyed since 1974. Since then there has been a significant increase in the reserve of some feral animals such as donkeys, and other species of feral animals may also have increased. This project will include a re-survey of the mammals of the Prince Regent Nature Reserve and an examination of the status of feral animals in the reserve, allowing the development of feral animal control projects as needed.

SUCCESS CRITERIA

Measurement of success is a vital part of "Western Shield" and will be coordinated by a person appointed within Nature Conservation Division (see Figure 1). Criteria to measure success will be based on the objectives defined above.

Measurement of success will involve:

1. Routine trapping and animal recording procedures carried out by CALM District operations staff as part of their normal work load.

2. Special monitoring undertaken by CALM scientific staff as part of the implementation of Recovery Plans, particularly where monitoring requires special techniques (eg, the numbat).

Monitoring of animal species within the proposed Fauna Reconstruction Sites and Species Recovery Sites already occurs via a variety of projects. Some of this work has no security of funding and additional monitoring projects must be developed (Tables 5 and 6). The assistance of volunteers from natural history clubs and local people will be sought in implementing monitoring projects.

Costs of Monitoring are shown in Table 7.

CONTROL OF FERAL CATS

The cat as predator

The cat is a somewhat enigmatic predator. It is a villain in the eyes of most people - more so than the fox. Perhaps this is because its predations are more visible when the domestic tabby brings in a garden bird. Cats were introduced to Australia long before foxes. Desert explorers like Carnegie encountered them, apparently well established, in the last century. Several species of native rodent became extinct at this time and cats may have played a role in this. However, it wasn't until foxes came to the west in the 1920s and later that the CWR marsupials apparently vanished. It has been suggested that foxes have been of far greater consequence to Australian fauna than cats, however cats have been implicated in extinctions and declines in Australia (and more so overseas), eg, CWR mammals and some birds on the Montebello Islands, wallabies and bandicoots on Dirk Hartog Island, mala in the Tanami Desert and rock-wallabies in Queensland.

In south-western WA, cats have not to date impeded the spectacular recovery of fauna like woylies, numbats, chuditch, possums and carpet pythons where foxes are controlled. However there are some species that appear not to respond well to fox baiting. Examples are malleefowl, dibbler and some rodents, such as the Walyadji (Western Mouse). Are cats the problem? There is little doubt that without dense cover noisy scrub-birds would be preyed on. One of only 14 Gilbert's potoroos so far located on Mt Gardner at Two Peoples Bay was apparently taken by a cat. Temporary exposure to predation when cover is lost to fire in a fragmented landscape that now disallows re-colonisation is likely to lead to further localised extinctions and the collective effect over time could be disastrous.

In more arid areas the recovery story is different. Cats have thwarted reintroductions and recovery of small populations. Examples include CSIRO's work on Heirisson Prong, the Mala program in the Tanami (NT) and the Desert Dreaming project in the Gibson Desert. Even at Karroun Hill on the edge of the wheatbelt, cats have been a problem to the successful re-introduction of numbats. Nevertheless CALM is proceeding with some special projects using prototype cat baits; notably Project Eden, the Montebello Island program and our involvement in the reintroduction of woylies to an arid part of the SA mainland as an action in the Woylie Recovery Plan. We are therefore combining operational scale actions with research, activities which are complementary.

Problems with baiting cats

Toxin. Like the fox, cats are highly susceptible to 1080 and this is the best toxin available at present. However many species of non-target (native) fauna outside the south west are much less tolerant to 1080 than the fauna in the south west. More work is needed to define the extent of this problem because we can't broadcast cat baits that will adversely affect the fauna we seek to recover.

Attractant. Cats use visual and auditory cues to hunt while foxes use olfactory cues. Therefore the scent of a bit of dried meat attracts foxes but is not usually sufficient to attract cats. Dr David Algar is trialing devices that act as hunting cues to foraging cats. To be able to bait large areas from aircraft we will need effective, cheap devices that do not require careful hand placement.

Inducement. Having attracted a cat to a bait it must be induced to eat it. Foxes readily eat carrion but cats prefer live prey. Pet food manufacturers faced with the same problem have developed an organic additive that is highly palatable to cats. Experiments on the Nullarbor with this additive on baits have been encouraging, but recent trials on Peron Peninsula (where there had been above average rainfall and many young rabbits) were disappointing. Dr Algar is continuing research in this area. The solution maybe as simple as delivering baits when food is scarce, but it may be more complex.

Palatability. Target animals need to eat the whole bait to ensure they don't ingest sub-lethal doses of 1080 and avoid baits thereafter. Cat baits need to be smaller than fox baits. Furthermore cats do not have the powerful jaws and teeth of foxes which readily take carrion including tough, hard, dried meat. Cat baits need to be soft and remain so in the field. It is possible to make sausages that meet these requirements, however the smaller size and softer, moist texture poses problems. They may be very attractive to a variety of non-target species including smaller dasyurids and rodents. It has already been demonstrated that Chuditch find 'sausage' baits highly palatable.

Interspecific interference. There is considerable anecdotal evidence of the interaction of feral predators such that control of one species may remove control of another. This was the experience in Desert Dreaming Project where cats increased in number after dingo/fox control. Until we can control cats we may not be able to offer fox protection to some populations of threatened mammals because to do so may expose them to cats which may be more effective predators of the remnant populations. These interactions need to be understood.

At present we don't know whether fox control for the benefit of populations in arid areas (eg, Spectacled Hare-wallaby, Bilby and, indeed, the apparently declining fauna of the south Kimberley, would exacerbate predation and their demise because of fox-cat interactions; we might even make it worse if we bait foxes without controlling cats as well. At present we can't control cats in those places.

Cat Research in CALM

CALM is a world leader in fox control. Innovative lateral thinking as well as exceptional commitment to lengthy field trips in remote areas by Dr Algar have also put CALM at the leading edge of cat control research. However work on cats has been going for much less time and with much lower resourcing. The secret to our success with foxes has been step by step developments from basic principles. We are applying the same principals to cat research. One of the dangers is the understandable enthusiasm of many people to grasp unproven prototype baits to deploy in critical situations. It is important that we do not lose support because of disappointing results from operational use of incompletely developed products or techniques. However trialing them will provide important feed-back to the research and may be effective in the field.

Until recently, all CALM research on cat control was funded through ANCA's Feral Pest Program (FPP). We have now been notified that the application for continuation of funds after June 1996 has not been successful as the Federal Government has not yet decided whether to renew funding to States for feral animal control work. Our current contract attracts $120,000 per year and funds the salaries of scientist Dr Algar and technician Ms Sinagra as well as vehicle running costs, field expenses and laboratory materials to June 1996.

Despite having worked with the Forests Department and then CALM for more than a decade Dr Algar still does not have job security. While it is hoped that the ANCA FPP will be continued after June 1996, it is important that Dr Algar and Ms Sinagra have some continuity in employment to maintain the cat research program. The Executive Director recognised this and has assured Dr Algar's salary (but not the costs of a technician or operating costs) for three years post June 1996.

The discussion of the problems facing cat baiting clearly demonstrate that there is a need to expand our cat control research effort. Aspects such as the impact of cat baits on non target species and factors influencing the uptake of baits by cats have not been researched. Currently our limited ability to control cats limits our ability to extend the benefit of fox control beyond the south west. CALM's goal must be to simultaneously control feral predators in all biomes and to extend the dream of reconstructing our fauna and the processes they drive throughout the State (except the Kimberley where we need to stop the rot before we have to undertake costly reconstructions). We believe that CALM needs to accelerate research and operational trials of cat control in a climate that allows longer-term planning of projects than is possible now.

Conclusions

CALM can be justly proud of its development of feral predator control. However fox management is well ahead of cat control and the lack of effective cat control is now a factor which severely limits to our ability to recover or reconstruct faunas beyond the south west of the State. Even where fox control is feasible it is often insufficient for fauna recovery because cats take over where the foxes left off.

CALM achieved its high level of fox control technology by working from fundamentals. The same approach is needed (and being followed) with cats. A combination of research with operational level field trials has great potential to accelerate cat control technology and simultaneously achieve critical conservation benefits but people must expect that failures and difficulties will occur in the early days and understand that they are part and parcel of the process of development of a robust technology.

Problems of bait delivery and uptake and protection of non-target native fauna are critical. If CALM is to prevent further decline of the remnant populations beyond the south west and even extend recovery of fauna beyond the area proposed in this document we need to increase resource allocation to cat research. This will require:

1. Security of tenure for Dr. Algar and an assurance of funding for his cat research. This currently costs $120,000 pa. His team would continue to refine appropriate bait types, attractants and delivery systems so as to produce a highly effective bait that can be distributed by aircraft at economically acceptable costs. It will include work on cat biology such as environmental factors affecting uptake of baits by cats.

2. A second scientist-technician team to become involved in cat control research with sufficient security that longer term (up to 5 years) projects can be planned with confidence. This team will investigate the problems associated with bait-design as it pertains to non-target fauna, susceptibility to 1080 of non-target species that may ingest cat baits and the geographical variability of this factor. Costs are going to be in the same order as Dr. Algar's costs and could possibly be met through reassessing priorities within SID.

CALM will take every opportunity to secure external funding in support of this work. But it is so fundamentally important to CALM's mission and obligations that it should be underwritten by CALM to the value of $120,000 pa for five years (this includes the Executive Director's

undertaking to provide a salary for Dr Algar) and we strongly recommend that Dr. Algar should be given the security of tenure offered by a permanent appointment to CALM's staff. Dr Algar will be unable to work effectively without technical support and we also recommend that the undertaking by the Executive Director be extended to provide a salary for a technical officer as well.

The development of effective control technology for feral cats is vital for the conservation of the CWR mammals that still remain in the semi-arid and arid zones, and for the re-introduction of CWR mammals to these areas. Current CALM's primary research input into this important area consists of one contract scientist and technical officer; much of the salaries and overheads are provided by the Commonwealth Government via its Feral Pests Program, which will cease at the end of 1995/96. CALM research into feral cat control will be stepped up with the allocation of resources to cover the projected shortfall from Commonwealth funds and to allow the contract of an additional scientist and technical officer so that cat control can be researched in a wider range of habitats.

Two cat control projects are underway or planned. Project Eden aims to control goats, sheep, foxes and feral cats on Peron Peninsula, Shark Bay. Funding for this project is ensured for the first two years. Montebello Renewal aims to eradicate black rats and feral cats from the Montebello Islands, off the Pilbara coast. Funding was provided by the Commonwealth at the time the Montebello Islands were returned to State control; however, this funding is inadequate for the complexities of the operation and additional funds are required.

CALM INTERNAL STRUCTURAL ARRANGEMENTS

The proposed management of this project is shown in Figure 1. Nature Conservation Division will be responsible for coordinating "Western Shield". Fox baiting will continue to be coordinated by Environmental Protection Branch, while a new position will be needed in WATSCU to coordinate monitoring and translocation projects. A position of "Western Shield" Community Involvement Coordinator will also need to be created within the Division. A "Western Shield" Steering Committee, chaired by the Director of Nature Conservation, will meet regularly to ensure that all planning and operations are on track. Members will include relevant senior CALM staff (Nature Conservation Division, Science and Information Division and Operations Division) and representatives from the WA Department of Agriculture and Landcare groups.

Most of the baiting and monitoring of fauna populations will be carried out by Regional and District staff as part of their routine works program. Advice from wildlife scientists within Science and Information Division will be provided routinely.

FUNDING

New funds are required for additional fox baiting, monitoring and translocation projects. A person to coordinate monitoring needs to be appointed within Nature Conservation Division. Most monitoring of success is proposed as part of routine District works programs. This is already developing, with District staff being trained in mammal conservation activities through the annual Batalling Mammal Conservation Course. Works programs within relevant Districts must be varied to accommodate the necessary work. Sponsorships and other external funding sources, as well as partnerships with the private sector, are proposed for some the more expensive, long term work associated with the re-introduction of animals to the south west of WA. Some experienced mammal and other vertebrate ecologists based at the Woodvale Wildlife Research Centre are becoming available for new projects due to the lack of available funding for existing work.

Currently CALM spends $253 640 per year on fox control. Some additional money come from scientific research projects that are funded externally; funding for several of these will cease over the next two financial years. To meet the additional objectives of "Western Shield", and cover external funds as the projects they are funding are completed, a total of $ 887 000 will be required per annum.

Additional total budget for a single financial year

It is envisaged that the positions of Monitoring Coordinator and Community Involvement Coordinator will be filled by internal transfer.

Extra baiting costs	$ 633,320
Extra success criteria costs	$ 93,950
Cat research (Algar; ANCA FPP money not renewed)	$ 120,000
Community Fox Control Coordinator	$ 63,500
TOTAL	**$ 910,770**

This budget does not include the costs of Project Eden (apart from fox baiting and $1,000 for monitoring), the extra funds required for Montebello Renewal (approx $70,000) or the costs of work in the Kimberley. The proposed Kimberley work has yet to be costed.

The budget can be phased in; not all work needs to commence immediately.

Areas that urgently need security of funding are: Townsend Ridges and Fitzgerald River.

Priorities for new areas are: Rainbow Ark (includes Two Peoples Bay, Waychinicup, Fitzgerald River, Lake Magenta), Perup-Denbarker (includes Perup, Kingston, Lake Muir), Southern Storm (includes D'Entrecasteaux, part of Walpole-Nornalup, Giants), Kalbarri, Ravensthorpe Range, and Cape Arid.

TABLE 1A. THREATENED AND EXTINCT MAMMALS OF THE SOUTH WEST OF WESTERN AUSTRALIA

A. EXTINCT SOUTH-WESTERN AUSTRALIAN MAMMALS
Kantjilpa (Pig-footed Bandicoot), *Chaeropus ecaudatus*
Broad-faced Potoroo, *Potorous platyops*
Crescent Nailtail Wallaby, *Onychogalea lunata*
Djooyalpi (Lesser Stick-nest Rat), *Leporillus apicalis*
Koolawa (Long-tailed Hopping-mouse), *Notomys longicaudatus*
Noompa (Large-eared Hopping-mouse), *Notomys macrotis*

B. MAINLAND POPULATIONS EXIST, REQUIRE ONGOING FOX CONTROL; SOME SPECIES REQUIRE TRANSLOCATION TO EXTEND RANGE
Chuditch, *Dasyurus geoffroii*
Dibbler, *Parantechinus apicalis*
Red-tailed Phascogale, *Phascogale calura*
Numbat, *Myrmecobius fasciatus*
Quenda, *Isoodon obesulus fusciventer*
Woylie, *Bettongia penicillata*
Gilbert's Potoroo, *Potorous tridactylus gilbertii*
Tammar Wallaby, *Macropus eugenii*
Black-flanked Rock-wallaby, *Petrogale lateralis lateralis*
Quokka, *Setonix brachyurus*
Western Ringtail Possum, *Pseudocheirus occidentalis*
Walyadji (Western Mouse), *Pseudomys occidentalis*
Dayang (Heath Rat), *Pseudomys shortridgei*

C. EXTINCT IN SOUTH WEST, REQUIRE RE-INTRODUCTION FROM ISLANDS OR AREAS OUTSIDE SOUTH WEST
Boodie, *Bettongia lesueur*
Rufous Hare-wallaby, *Lagorchestes hirsutus*
Banded Hare-wallaby, *Lagostrophus fasciatus*,
Bilby, *Macrotis lagotis*
Western Barred Bandicoot, *Perameles bougainville*
Wopilkara (Greater Stick-nest Rat), *Leporillus conditor*
Djoongari (Shark Bay Mouse), *Pseudomys fieldi*

D. PRIORITY LIST MAMMALS OF THE SOUTH WEST
Brush-tailed Phascogale, *Phascogale tapoatafa*,
Rakali (Water-rat), *Hydromys chrysogaster*

E. OTHER SOUTH WEST MAMMALS THAT REQUIRE PROTECTION FROM FOXES
Brushtail Possum, *Trichosurus vulpecula*,
Western Brush Wallaby, *Macropus irma*

TABLE 1B. OTHER THREATENED OR SPECIALLY PROTECTED FAUNA THAT SHOULD BENEFIT FROM FOX CONTROL

Malleefowl, *Leipoa ocellata*
Western Ground Parrot, *Pezoporus wallicus flaviventris*
Western Swamp Tortoise, *Pseudemydura umbrina*
Carpet Python, *Morelia spilota imbricata*

TABLE 2. CURRENT FOX BAITING OPERATIONS

SITE	DISTRICT/S	AREA BAITED (ha)	SOURCE OF FUNDS	TENURE OF FUNDS	NUMBER OF BAITS PER YEAR	BAITINGS PER ANNUM	CALM FUNDS ALLOCATED PER YEAR
Boyagin NR	Narrogin	4,781	EPB/District	Annual	11,700	13	$11,550
Boyanup/Dardanup SF	Mornington	3,500	District	Annual	300	2	$400
Broadwater - New River	SW Capes	50	District	Annual	200	1	$500
Calvert Range (VCL)	Goldfields	15,000	CRA	finish 1997	1,000	4	$0 (externally funded)
Cape Range NP	Exmouth	1,250	EPB	Annual	5,000	2	$1,600
Comb's (PP)	Narrogin	100	EPB/District	Annual	455	13	$450
Corackerup NR	Albany	4,000	CALM/ MFPG/ Shire	Annual	800	4	$500
Crooke's (PP)	Narrogin	20	EPB/District	Annual	650	13	$640
Dolphin Is and Burrup Peninsula	Karratha	8,509	EPB & Woodside Petroleum	Annual	2,000	1	$4,400
Dongolocking NR	Katanning	1,100	District/ANCA	3 yrs to 1997	2,200	13	$4,850
Dragon Rocks NR	Katanning	32,218	ANCA	to 1997	8 800	8	$0 * to 1997
Dryandra / Bald Rock / Montague	Narrogin	13,818	EPB/District	Annual	23,400	13/7	$17,530
East Yornaning NR	Narrogin	248	ANCA/District	to 1997	975	13	$960
Ellen Brook NR	Perth	40	District	Annual	24	2	$600
Fitzgerald River NP	Albany	0		finished			
Gardiner's (PP)	Narrogin	30	EPB/District	Annual	364	13	$355
Gull Rock NP	Albany	2,000	District	Annual	240	4	$350
Gundaring NR	Narrogin	127	EPB/District	Annual	455	13	$450
Hills Forest	Mundaring	foxglove	District	Annual	1,020	4	$700
Jaloran Rd Timber Res	Katanning	450	District/ANCA	3 yrs to 1997	950	12	$1,890

SITE	DISTRICT/S	AREA BAITED (ha)	SOURCE OF FUNDS	TENURE OF FUNDS	NUMBER OF BAITS PER YEAR	BAITINGS PER ANNUM	CALM FUNDS ALLOCATED PER YEAR
Julimar CP + Bindoon Army training area	Mundaring	foxglove	District, Dept of Defence via SID	Annual	2,920	4	$0* ANCA to 1995
Karroun Hill NR	Merredin	40,000	ANCA via SID	3 yrs to 1997	6,000	2	$6,000
Kingston SF	Manjimup	25,000	SID	Annual	4,000	4	$5,000
Lake Muir NR & SF	Manjimup	30,000	District	Annual	2,000	2	$2,000
Leschenault Peninsula CP	Mornington	1,000	District	Annual	1,500	13	$2,000
Mooradung NR	Dwellingup	631	District	Annual	100	2	$ 600
Mt Caroline NR	Narrogin	352	EPB/District	Annual	1,206	13	$1,190
Mt Stirling NR	Narrogin	225		Annual		13	$1,000
Nangeen Hill NR	Narrogin	176	EPB/District	Annual	1,430	13	$1,415
Operation Foxglove	Mundaring, Dwellingup, Mornington	550,000	ALCOA & CALM via EPB	Annual	90,000	2,4,6	$127,000
Peron Peninsula (Project Eden)	Gascoyne	100,000	SID	3 yrs finish in 1997	10,000	4	$10,000
Perup NR	Manjimup	50,000	District	Annual	2,400	2	$5,000
Pingeculling NR	Narrogin	243	EPB/District	Annual	975	13	$960
Ruabon NR	SW Capes	15	District	Annual	24	1	$100
Sales Rock (PP)	Narrogin	150	EPB/District	Annual	455	13	$450
St Johns CP	Blackwood	6,000	District	Annual	800	2	$1,500
Thompsons Lake NR	Perth	300	District	Annual	400	2	$2,000
Torndirrup NP	Albany	400	District	Annual	100	1	$200
Townsend Ridges	Goldfields	1,000	ANCA, CALM	Annual	3,000	20	$16,000 (ANCA), $9,000 (CALM)
Tuart Forest NP & SF	SW Capes	4,000	District	Annual	2,400	12	$17,000
Tutakin Rock NR	Narrogin	20	EPB/District	Annual	? included in Sales Rock	13	$450

SITE	DISTRICT/S	AREA BAITED (ha)	SOURCE OF FUNDS	TENURE OF FUNDS	NUMBER OF BAITS PER YEAR	BAITINGS PER ANNUM	CALM FUNDS ALLOCATED PER YEAR
Tutanning NR	Narrogin	2,369	EPB/District	Annual	9,750	13	$9,590
Twin Swamps NR	Perth	155	District	Annual	253	2	$1,850
Two Peoples Bay NR	Albany	4,500	District	Annual	864	4	$1,000
Weam NR	Narrogin	224	ANCA/District	Annual to 1997	975	13	$960
Yalgorup NP	Dwellingup	1,412	Pindan Pty Ltd via SID	to 1997	600	13	0
TOTAL		905,413					$253,640

TABLE 3. PROPOSED FAUNA RECONSTRUCTION SITES AND SPECIES RECOVERY SITES FOR THREATENED ANIMALS IN THE SOUTH WEST OF WESTERN AUSTRALIA

	Chuditch	Dibbler	Red-tailed Phascogale	Numbat	Bilby	Quenda	Western Barred Bandicoot	Woylie	Boodie	Gilbert's Potoroo	Rufous Hare-wallaby	Banded Hare-wallaby	Tammar Wallaby	Black-flanked Rock-wallaby	Quokka	Western Ringtail Possum	Walyadji (Western Mouse)	Dayang (Heath Rat)	Wopilkara (Stick-nest Rat)	Djoongari (Shark Bay Mouse)	Malleefowl	Western Ground Parrot	Carpet Python	Western Swamp Tortoise
Batalling	P			P(I)		P		P(I)					P(I)			P								
Boyagin			P	P(I)		I		P(I)					P											
Cape Arid	I					?P	I						I								?P	P	P	
Cape Le Grande																								
Corackerup													?P								P			
D'Entrecasteaux										I					P	P						I		
Dongolocking			P			P(I)							?P											
Dragon Rocks	I		I	I	I		?I	I	I		I	I					P	P			P			
Dryandra	P		P	P	I	I	I	P	I		I	I	P			I					P		P	
East Tornaning			P																					
Ellen Brook																								P
Fitzgerald	?P	P	P		I	P	I	?P					?P								?P	P	P	
Haloran			P										P											
Julimar	P(I)			I		P(I)		P(I)					I										P	
Kalbarri	I						I	I	I		I	I	I	I							?P			
Karroun Hill				P(I)																	P			
Lake Magenta	I		I		I	I	?I	I	I		I	I	?P					P			P			
Leschenault						I										P(i)								
Mt Caroline														P										
Mt Stirling														P										

	Chud itch	Dibbler	Red-tailed Phascogale	Numbat	Bilby	Quenda	Western Barred Bandicoot	Woylie	Boodie	Gilbert's Potoroo	Rufous Hare-wallaby	Banded Hare-wallaby	Tammar Wallaby	Black-flanked Rock-wallaby	Quokka	Western Ringtail Possum	Walyadji	Dayang	Wopilkara	Djoongari	Malleefowl	Western Ground Parrot	Carpet Python	Western Swamp Tortoise
Nangeen Hill														P										
Noggerup	P					P		?P																
Northern Jarrah	P		?P	I				P(I) & I							P & I								P	
Peron	I			I	I		I	I			I	I							I	I				
Perup - Denbarker	P			P		P		P					P		?P	P					?P			
Pingeculling			P																					
Ravensthorpe Range			?P			?P							?P				P	P			P			
Saddleback - Quindanning	P																							
St Johns	P					P									P									
Stirling Range	I					?P		I					I		P						P		P	
Torndirrup		P																						
Tuart Forest NP & SF						?P										P								
Tutakin														P										
Tutanning			P	P(I)		P(I)		P					P								P		P	
Twin Swamps						P																		P
Two Peoples Bay						P				P					P	P							P	
Waychinicup		P				?P										?P						P		
Weam			P												P	P								
Yabberup	P					P																		
Yalgorup	P															P(I)							P	
ISLANDS	-	2	-	-	-	1	2	-	2	-	2	2	3	3	2	-	-	-	1	1	-		5	-

TABLE 4. PRIORITY LIST MAMMALS AND OTHER MAMMALS THAT REQUIRE PROTECTION FROM FOXES - OCCURRENCE IN PROPOSED FAUNA RECONSTRUCTION SITES AND SPECIES RECOVERY SITES FOR THREATENED MAMMALS IN THE SOUTH WEST OF WESTERN AUSTRALIA

	Brush-tailed Phascogale	Rakali (Water-rat)	Brushtail Possum	Brush Wallaby
Batalling	P		P	P
Boyagin			P	P
Cape Arid			?P	?P
Cape Le Grande				?P
Corackerup				
D'Entrecasteaux	?P	P	P	P
Dongolocking			P	P
Dragon Rocks			P	?P
Dryandra			P	P
East Yornaning			P	?P
Ellen Brook				
Fitzgerald		?P	P	P
Jaloran			P	?P
Julimar			P(I)	?P
Kalbarri			I	?P
Karroun Hill				
Lake Magenta			P	P
Leschenault				
Mt Caroline				
Mt Stirling				
Nangeen Hill				
Noggerup	?P		P	P
Northern Jarrah	P	P	P	P
Peron			I	
Perup - Denbarker	P	?P	P	P
Pingeculling			P	?P
Ravensthorpe Range			?P	P
Stirling Range	?P		P	?P
Torndirrup			?P	
Tuart Forest	P		P	
Tutakin				
Tutanning			P	P
Twin Swamps			?P	
Two Peoples Bay		P	P	P
Waychinicup		?P	?P	?P
Weam			P	?P
Yabberup			P	P
Yalgorup		P	P	P
ISLANDS	-	-	-	-

Key:

P naturally present, requires fox control;

?P presence requires confirmation; if not present re-introduction proposed after preparation and funding of Interim Wildlife Management Guidelines and Translocation Proposal

P(I) re-introduced population present, requires fox control;

I re-introduction proposed after preparation and funding of Interim Wildlife Management Guidelines and Translocation Proposal

Note: D'Entrecasteaux includes Walpole-Nornalup

TABLE 5. STATUS OF MONITORING AT PROPOSED FAUNA RECONSTRUCTION SITES IN WA.

SITE	SPECIES TO BE CONSERVED	MONITORED ?	PROGRAM	FUNDING	RESPONSIBILITY
Batalling	Chuditch, Numbat, Quenda, Woylie, Tammar Wallaby, Western Ringtail Possum	yes	Chuditch Recovery Plan, (funded to Dec 1996) Numbat Recovery Plan (to Dec 1999)and Woylie recovery plans (to Dec 1995), Tammar Wallaby (District)	ANCA, CALM	Mornington District, SID
Cape Arid	Chuditch, Quenda, Western Barred Bandicoot, Tammar Wallaby, Malleefowl	no			
D'Entrecasteaux	Potoroo, Quokka, Western Ringtail Possum, Ground Parrot	no			
Dragon Rocks	Red-tailed Phascogale, Numbat, Bilby, Woylie, Boodie, Rufous Hare-wallaby, Banded Hare-wallaby, Walyadji, Dayang, Malleefowl	no	Numbat recovery plan (to 2004, funded to Dec 1999)	ANCA, CALM	Katanning District, SID
Dryandra	Chuditch, Red-tailed Phascogale, Numbat, Bilby, Quenda, Western Barred Bandicoot, Woylie, Boodie, Rufous Hare-wallaby, Banded Hare-wallaby, Tammar Wallaby, Western Ringtail Possum, Carpet Python	yes	Woylie and Numbat recovery plans. (Woylie to Dec 1995, Numbat to 2004, funded to end 1999)	ANCA, CALM	Narrogin District, SID

SITE	SPECIES TO BE CONSERVED	MONITORED ?	PROGRAM	FUNDING	RESPONSIBILITY
Fitzgerald	Chuditch, Dibbler, Red-tailed Phascogale, Bilby, Quenda, Western Barred Bandicoot, Woylie, Tammar Wallaby, Malleefowl	no (Kinnear project completed)			
Julimar	Chuditch, Brushtail Possum, Woylie, Quenda, Tammar Wallaby, Carpet Python	yes	Chuditch recovery plan (to 2001, funded to Dec 1996)	ANCA, CALM	SID
Kalbarri	Chuditch, Western Barred Bandicoot, Woylie, Boodie, Rufous Hare-wallaby, Tammar Wallaby, Black-flanked Rock-wallaby, Malleefowl	no			
Lake Magenta	Chuditch, Red-tailed Phascogale, Bilby, Quenda, Western Barred Bandicoot, Woylie, Boodie, Rufous Hare-wallaby, Banded Hare-wallaby, Tammar Wallaby, Dayang	no (will commence Sept 1996)	Chuditch recovery plan (to 2001, funded to Dec 1996)	ANCA, CALM	Katanning District, SID
Northern Jarrah	Chuditch, Red-tailed Phascogale, Numbat, Woylie, Quokka, Carpet Python.	yes	Operation Foxglove (funded to 1998), Numbat Recovery Plan (to 1999), Chuditch Recovery Plan (to 1996)	ANCA, CALM	SID, Mornington District
Peron	Chuditch, Numbat, Bilby, Western Barred Bandicoot, Woylie, , Rufous Hare-wallaby, Banded Hare-wallaby, Wopilkara, Djoongari	yes	Project Eden (1995-2001?)	CALM	Shark Bay District, SID

SITE	SPECIES TO BE CONSERVED	MONITORED ?	PROGRAM	FUNDING	RESPONSIBILITY
Perup - Denbarker	Chuditch, Numbat, Quenda, Woylie, Tammar Wallaby, Quokka, Western Ringtail Possum	yes	Woylie Recovery Plan (to Dec 1995)	CALM	SID
Stirling Range	Chuditch, Quenda, Woylie, Tammar Wallaby, Quokka, Malleefowl	no			

TABLE 6. STATUS OF MONITORING AT PROPOSED SPECIES RECOVERY SITES IN WA

SITE	SPECIES CONSERVED	MONITORING ?	PROGRAM	FUNDING	RESPONSIBILITY
Boyagin	Woylie, Numbat, Red-tailed Phascogale, Woylie, Tammar Wallaby,	yes	Numbat Recovery Plan (to 2004, funded to Dec 1999), Woylie recovery plan (to Dec 1995)	ANCA, CALM	SID, Narrogin District
Corackerup	Tammar Wallaby, Malleefowl	some	Malleefowl Preservation Group	Malleefowl Preservation Group	
Dongolocking	Red-tailed Phascogale, Quenda, Tammar Wallaby	yes	Red-tailed Phascogale research (to 1996), Quenda translocation (to 1996)	ANCA, CALM, MRD	SID, Katanning District
East Yornaning	Red-tailed Phascogale	yes	Red-tailed Phascogale research (to Dec 1996)	ANCA, CALM	SID Narrogin District
Ellen Brook	Western Swamp Tortoise				
Jaloran	Red-tailed Phascogale, Tammar Wallaby	yes	Red-tailed Phascogale research (to Dec 1996)	ANCA, CALM	SID, Katanning District
Karroun Hill	Numbat	yes	Numbat Recovery Plan (to 2004, funded to Dec 1999)	ANCA, CALM	SID
Leschenault	Quenda, Western Ringtail Possum	yes	Western Ringtail Possum IWMG (to Dec 1996)	CALM, Pindan	SID
Mt Caroline	Black-flanked Rock-wallaby	yes?	Fox predation research	CALM	SID
Mt Stirling	Black-flanked Rock-wallaby	yes?	Fox predation research	CALM	SID
Nangeen Hill	Black-flanked Rock-wallaby	yes?	Fox predation research	CALM	SID
Pingeculling	Red-tailed Phascogale	yes	Red-tailed Phascogale research (to Dec 1996)	ANCA, CALM	SID, Narrogin District
Torndirrup	Dibbler	??			
Tutakin	Black-flanked Rock-wallaby	yes?	Fox predation research	CALM	SID
Tutanning	Red-tailed Phascogale, Numbat, Quenda, Woylie, Tammar Wallaby	some	Woylie Recovery Plan (to Dec 1995)	ANCA, CALM	SID, Narrogin District
Twin Swamps	Western Swamp Tortoise, Quenda, Brushtail Possum	yes	Western Swamp Tortoise Recovery Plan	ANCA, CALM	SID, UWA Zoology

SITE	SPECIES CONSERVED	MONITORING?	PROGRAM	FUNDING	RESPONSIBILITY
o Peoples Bay	Gilbert's Potoroo, Quenda, Western Ringtail Possum, Brushtail Possum	some?	Potoroo IWMG (to Dec 1997)	IWMG	SID, Albany District
Waychinicup	Dibbler	yes	Dibbler research (to 1997)?)	ANCA, CALM	SID
Weam	Red-tailed Phascogale	yes	Red-tailed Phascogale research (to Dec 1996)	ANCA, CALM	SID, Narrogin District
Yalgorup	Chuditch, Western Ringtail Possum	yes	Western Ringtail Possum IWMG (to Dec 1996)	CALM, Pindan	SID
Bald Island	Quokka	no, but genetics research underway.			UWA??
ernier Island	Western Barred Bandicoot, Rufous Hare-wallaby, Banded Hare-wallaby, Boodie, Djoongari	Djoongari yes, proposed for Western Barred bandicoot, Rufous Hare-wallaby, Banded Hare-wallaby and Boodie.	draft Western Barred Bandicoot IWMG, Djoongari recovery plan (to 1999) draft Rufous Hare-wallaby recovery plan	ANCA, CALM, CCNT??	SID
langer /Whitlock Islands	Dibbler	yes	Dibbler research (to Dec 1997)	research plan	SID
Daw Island	Quenda	no			
Dorre Island	Western Barred Bandicoot, Rufous Hare-wallaby, Banded Hare-wallaby, Boodie	no, proposed for Rufous Hare-wallaby, Banded Hare-wallaby and Boodie	draft Rufous Hare-wallaby recovery plan draft WBB IWMG	CALM, CCNT	SID
& West Wallabi Islands	Tammar Wallaby	no			
arden Island	Tammar Wallaby	no (previous survey by UWA)			Commonwealth
Middle Island	Tammar Wallaby	no			
ndrain, Westall, Wilson	Mondrain Rock-wallaby	no			
rth Twin Peaks	Tammar Wallaby	no			
ottnest Island	Quokka	no			UWA
alisbury Island	Black-flanked Rock-wallaby	no			
lutation Island	Wopilkara	yes	Wopilkara recov. plan (to 1996)	ANCA, CALM	SID, Shark Bay District

TABLE 7. OPERATING COSTS (NOT SALARIES) REQUIRED FOR ASSESSING SUCCESS OF "WESTERN SHIELD"

SITE	# SPECIES	ANNUAL FAUNA ASSESSMENT COSTS $				RESPONSIBILITY	OTHER GROUPS INVOLVED	COMMENTS
		vehicle	T/A & O/T	sundries	TOTAL			
Batalling	6	1 000	500	350	1 850	CALM Mornington	eco tours	commuting from Collie, ecotourists at Maxon farm
Boyagin	4	1 000	500	350	1 850	CALM Pingelly		commute from Pingelly
Calvert Range	1	2 000	1 500	500	4 000	CALM Karratha	CRA	
Cape Arid	6	2 000	2 500	500	5 000	CALM Esperance	NP rangers	camp on site
Cape Le Grande	7	1 500	2 500	500	4 500	CALM Esperance	NP rangers	camp on site
Cape Range	1	500	500	500	1 500	CALM Exmouth	NP rangers, ecotours	commute from Exmouth
Collie Coal Basin	2	1 000	500	350	1 850	CALM Mornington		
Coombs	1	200	200	100	500	CALM Narrogin		
Corackerup	2	1 000	1 000	350	2 350	CALM Albany	Malleefowl Preservation Group, LCDC	camp on site
Crooks	1	200	200	100	500			
D'Entrecasteaux	3	2 000	2 000	500	4 500	CALM Pemberton		commute from Pemberton
Depuch Island	1	1 000	750	500	2 250	CALM Karratha	Robe River Iron	camp on site
Dolphin Island/ Burrup	1	1 500	750	350	2 600	CALM Karratha	Woodside	commute from Karratha, use boat
Dongolocking	3	1 000	500	350	1 850	CALM Narrogin		commute from Narrogin
Dragon Rocks	12	1 500	2 200	500	4 200	CALM Katanning		camp on site
Dryandra	13	1 150	500	350	2 000	CALM Narrogin		commuting from Narrogin
East Yornaning	1	500	250	350	1 100	CALM Narrogin		commute from Narrogin
Ellen Brook	1	500	250	350	1 100	CALM Perth	UWA	commute from Wanneroo
Fitzgerald	10	2 000	2 500	500	5 000	CALM Albany	NP rangers, LCDC	camp at Twertup
Gardiners	1	1 000	500	350	1 850	CALM Narrogin		
Gull Rock	1	500	250	350	1 100	CALM Albany		
Gundaring	1	1 000	500	350	1 850	CALM Narrogin		
Hills Forest	3	1 000	500	350	1 850	CALM Mundaring		
Jaloran	2	500	250	350	1 100	CALM Narrogin		commute from Narrogin

SITE	# SPECIES	ANNUAL FAUNA ASSESSMENT COSTS $				RESPONSIBILITY	OTHER GROUPS INVOLVED	COMMENTS
		vehicle	T/A & O/T	sundries	TOTAL			
Julimar	6	1 000	500	350	1 850	CALM Mundaring	Toodyay Naturalists	
Kalbarri	9	2 000	3 000	500	5 500	CALM Greenough	NP rangers	
Karroun Hill	2	1 000	2 500	500	4 000	CALM Merredin		
Kingston	6	2 500	750	750	4 000	CALM Manjimup		
Lake Magenta	11	1 500	2 200	500	4 200	CALM Katanning	LCDC	camp on site
Lake Muir - Denbarker	8	1 200	500	350	2 050	CALM Manjimup CALM Walpole		commute from Perup.
Leschenault	2	750	500	350	1 600	CALM Bunbury		commute from Bunbury
Mooradung	?	200	200	100	500	CALM Dwellingup		
Mt Caroline	1	500	250	350	1 100	CALM Narrogin?		commute?, camp on site?
Mt Stirling	1	500	250	350	1 100	CALM Narrogin?		
Nangeen Hill	1	500	250	350	1 100	CALM Narrogin?		
Noggerup	4	1 000	500	350	1 850	CALM Blackwood	Friends of the Chuditch	commute from Kirup
Northern Jarrah	6	3 000	1 600	1 100	5 700	CALM Mundaring CALM Dwellingup CALM Mornington		2 sites in each District (ex Paul De Tores sites), commuting from District HQ
Peron	9	3 500	3 000	500	7 000	Operation Eden project team	community	
Perup	6	1 200	500	350	2 050	CALM Manjimup	Friends of Perup	
Pingeculling	1	500	250	350	1 100	CALM Narrogin		commute from Narrogin
Ravensthorpe Range	4	1 000	1 000	500	2 500	CALM Esperance	NP rangers, community	camp on site
Saddleback / Quindanning	4	800	350	350	1 500	CALM Dwellingup	Worsley	
Sales Rock	1	200	200	100	500	CALM Narrogin		
St. Johns	4	500	250	350	1 100	CALM Blackwood	ecotours	commute from Nannup
Stirling Range	7	1 000	500	350	1 850	CALM Albany	NP rangers	commute from Albany
Thompsons Lake	1	200	200	100	500	CALM Perth		

SITE	# SPECIES	ANNUAL FAUNA ASSESSMENT COSTS $				RESPONSIBILITY	OTHER GROUPS INVOLVED	COMMENTS
		vehicle	T/A & O/T	sundries	TOTAL			
Torndirrup	1	500	250	350	1 100	CALM Albany	NP rangers, local residents	commute from Albany
Townsend Ridges	1	?	?	?	4 000	CALM Kalgoorlie	aboriginal community	
Tuart Forest	1	500	250	350	1 100	CALM Busselton		commute from Busselton
Tutakin	1				see Sales	CALM Narrogin		
Tutanning	6	1 000	500	350	1 850	CALM Pingelly		commute from Pingelly
Twin Swamps	1	500	250	350	1 100	CALM Perth	UWA	commute from Wanneroo
Two Peoples Bay	5	750	500	350	1 600	CALM Albany	resident reserve management officer	live on site
Waychinicup	1	1 000	500	350	1 850	CALM Albany		commute from Albany? camp at Cheynes Beach?
Weam	1	500	250	350	1 100	CALM Narrogin		commute from Narrogin
Yalgorup	3	1 000	500	350	1 850	CALM Dwellingup	NP rangers	commute from Dwellingup
ISLANDS	12				15 000			
TOTAL					137300			