

WESTERN SHIELD - BRINGING BACK WILDLIFE FROM THE BRINK OF EXTINCTION

R. Armstrong¹ and F. Batini²

¹ Department of Conservation and Land Management, PO Box 1693, Bunbury WA, 6230

² Department of Conservation and Land Management, Locked Bag 104, Bentley Delivery Centre WA, 6983

THE FOX

The European Red fox (*Vulpes vulpes*) is considered to be a major contributing factor to the decline of native wildlife populations across Australia over the last century. The fox was introduced into Australia in the late 1860s and 1870s (Troughton 1957) to provide hunting opportunities for our British Isles forefathers. By 1930, some 70 odd years later, the fox had inhabited the entire southern half of the continent (Jarman 1986). It was aided in its colonisation of Australia by another immigrant, the rabbit. Foxes closely followed the rabbit invasion, using the rabbit population as an opportune and reliable food resource (Christensen 1980a; Long 1988).

Since European settlement of Australia, at least 18 species of mammal have become extinct (Burbidge and Friend 1990) including 16 of the 112 taxa of marsupials. Many species of the remaining fauna have experienced declines in both population range and size. Using 1994 IUCN Red List categories and criteria, 5 taxa are Critically Endangered, 17 marsupial taxa are endangered, and 31 are vulnerable with a further 41 near threatened and 1 being conservation dependent (Maxwell et al. 1996). In Western Australia 25 mainland mammal species are listed as threatened under State legislation and a further 6 species now survive only or primarily on fox free offshore islands.

Table 1. Status of Australia's marsupials

Total number of species and subspecies = 112

IUCN CATEGORY	No. of taxa
Extinct	16
Extinct in the wild	1
Critically endangered	5
Endangered	17
Vulnerable	31
Lesser concern (conservation dependent)	1
Lesser concern (near threatened)	41

The most dramatic declines have been observed in non-flying mammals with body weights in the range of 35g to 8000g (Burbidge and McKenzie 1989). These animals typically vary in size from a mouse to a small wallaby and are termed Critical Weight Range (CWR) animals. The most threatened of these are now found only in isolated refuges such as dense thicket vegetation or inaccessible rocky terrains where predation pressure from foxes is presumed to be lower.

Fox control experiments in Western Australia by CALM scientists over the past two decades have demonstrated that a significant reduction in fox predation results in the rapid and significant increase of native wildlife population levels (Kinnear et al. 1984; Kinnear et al. 1988; Burbidge and Friend 1990; Friend 1990; Kinnear 1990; Kinnear 1992a; Morris 1992). Fox control is one of the single most important issues in reversing the headlong decline of many of our native wildlife species toward certain extinction.

Armed with this knowledge, a large scale wildlife recovery program based on fox control was initiated across southern Western Australia. The program is called Western Shield. Western Shield fox control operations in Western Australia now extend over more than 3.4 million hectares (3,400 square kilometres) of conservation

lands in the south west. By the year 2000 the area under fox control will be in excess of 5.5 million hectares which is approximately equivalent to 85% of the area of Tasmania or 24% of the area of Victoria.

Fox control is achieved by utilising dried meat baits containing sodium fluoroacetate (1080). Fortunately for wildlife conservation in Western Australia, this compound occurs naturally in a group of plants belonging to the genus *Gastrolobium*, commonly referred to as the "poison peas". These plants are common and widespread in the south west of Western Australia. Because the native wildlife have co-evolved with this compound, they exhibit a very high tolerance to its toxic effect. Introduced animals however, do not have the same tolerance and are very susceptible to this toxin. This property, in conjunction with its ability to be quickly detoxified by fungi and bacteria make it a very useful tool for controlling feral animals, including the fox.

Dried meat baits are laid either by aerial or ground baiting operations at least 4 times per year at an intensity of 5 baits per square kilometre. The operation is extremely cost effective at approximately \$0.24 /ha /annum over the entire program.

A number of wildlife species considered threatened or endangered have already benefited from the baiting program including the black-footed rock-wallaby (*Petrogale lateralis*), Rothschild's rock-wallaby (*P. rothschildi*), the numbat (*Myrmecobius fasciatus*), tammar wallaby (*Macropus eugenii*), the woylie (*Bettongia penicillata*), quenda (*Isodon obesulus*), bilby (*Macrotis lagotis*), Quokka (*Setonix brachyurus*), Gilbert's potoroo (*Potorous gilbertii*), the common brushtail possum (*Trichosurus vulpecula*), western ringtail possum (*Pseudocheirus occidentalis*), chuditch (*Dasyurus geoffroii*) western brush wallaby (*Macropus irma*) and the mallee fowl (*Leipoa ocellata*).

The two most notable recoveries have been Gilbert's potoroo that was presumed extinct for over 80 years and the woylie which has been removed from the State and Commonwealth endangered species lists. Many other species have exhibited spectacular recoveries as a result of fox baiting alone (Fig 1.).

Fox baiting will need to continue until an alternate technology is available for fox control. At present a Cooperative Research Centre for Vertebrate Pest Control is studying the development of an immunosterilisation technology that may result in fertility control of the Australian fox population leading to reduced predation on native wildlife. This research is high risk and capital intensive and useful results may not eventuate for a decade or more, if at all.

THE CAT

Another carnivore, the feral cat (*Felis catus*) is suspected of contributing to the decline of native fauna in the arid and semi- arid zone of the State. It has certainly been responsible for the failure of wildlife re-introduction experiments in Western Australia and the Northern Territory. As part of the Western Shield program a significant research and development effort is being made to develop a technology that will allow the control of feral cats on an operational scale. Considerable progress has been made toward an effective baiting technology. A tailored cat bait, complete with palatability enhancers, auditory lures and a cat specific toxin is very close to becoming operational. Concurrent work is being undertaken on the ecology of the feral cat which will enable us to deliver the bait to feral cats with the most appropriate timing and placement for maximum effect.

It is expected that this cat control technology will be operational by the year 2000. This will allow the expansion of the Western Shield fox and cat control operations into the arid and semi-arid zones of the State to arrest wildlife decline.

THE RABBIT

Introduced predators are dependant in many areas on the abundance of rabbits to supplement their diet. It is imperative that predator control be undertaken with a holistic approach to feral animal control in mind. Feral predator control is much easier to achieve if rabbits can be controlled in sympathy.

Integrated rabbit control with Western Shield predator control operations was hopefully to be achieved with the aid of Rabbit Calicivirus Disease (RCD). Unfortunately, the only place in Western Australia that has been impacted by RCD is the Nullabor. RCD is yet to demonstrate the significant impacts it had in South Australia

after its escape to the mainland in 1996. Until such time as RCD becomes a significant control mechanism for rabbits, conventional means of control will have to be continued.

SUPPORT FROM THE RURAL COMMUNITY

The rural community has significant role to play in wildlife conservation. Although the majority of Western Australia's conservation lands will be under predator control operations by the turn of the century, there is a considerable area of native vegetation on privately held lands in the south west of the State that can and is sustaining native wildlife populations. These populations are under the same if not greater predation pressure than wildlife on conservation lands due to the small areas of native vegetation involved, their high boundary to area ratios and the high population density of foxes on surrounding agricultural lands.

There are also considerable areas of land in the arid and semi-arid zones of the State that are virtually unpopulated. The only permanent residents are pastoralists and aboriginal communities, both of whom have become involved in wildlife conservation. Aboriginal communities are undertaking fox control operations at two sites to protect isolated and genetically very significant populations of rock wallaby. Several pastoral leases adjacent to conservation reserves that are held by mining companies have entered into Minutes of Understanding with CALM to manage their lease holdings in sympathy with the conservation objectives of the reserve. This includes feral predator control and wildlife conservation.

In Western Australia there has been an encouraging reaction from rural communities to the Western Shield program. Many farmers have initiated twice yearly baiting programs on their holdings adjacent to Western Shield baiting targets. These private property baiting programs are usually orchestrated events that complement the Western Shield baiting operations in August/September and March/April. These two baiting times impose the maximum kill rate on the fox population and generally fit with the protection of agricultural values such as lambing times. Land Conservation Districts Committees and catchment groups have been very active in liaison with Agriculture Western Australia in organising community baiting programs over large areas of their catchment. Currently there are over 150 LCDC and community catchment groups involved in complementary community baiting programs. Fox baiting on private lands was estimated to cover in excess of 6 million hectares of farm land in 1997 (M. Butcher AgWA pers com).

There are other groups in the rural community that play a significant role in wildlife conservation in Western Australia. One of the most successful is the Mallee Fowl Preservation Group from Ongerup in the Great Southern region of Western Australia. This group of interested farmers has undertaken a thorough survey of malleefowl activity in their locality and set up a network of supporters right across Western Australia. They are active in the conservation of malleefowl by undertaking fox baiting activities on Nature Reserves in their area and encouraging farmers to adopt fox baiting and habitat management on their farms to ensure the conservation of malleefowl. The group undertakes regular monitoring of mallee fowl populations that contribute meaningfully to the conservation of this species.

The contribution of the rural community not only contributes significantly to the conservation of Australia's natural heritage but adds another dimension to the farm business by making available opportunities for nature based tourism enterprises.

SUPPORT FROM THE CORPORATE COMMUNITY

The corporate community has supplied significant backing to Western Shield. Alcoa Australia Pty Ltd sponsors the program by \$120,000 per annum to enable the ongoing baiting of 550,000 hectares between Perth and Collie. This baiting operation, a subset of Western Shield called Operation Foxglove, has allowed operational research funded by Environment Australia to be carried out. The research is aimed at determining the relative effectiveness of different baiting regimes on wildlife recovery rates, fox density and re-invasion behaviour of foxes back into areas post baiting. The information delivered by this research program will allow fine tuning of fox baiting regimes to optimise cost effectiveness.

Operation Foxglove contains the bulk of Alcoa's mining lease in the northern jarrah forest. Their three mine sites at Jarrahdale, Huntly (near Dwellingup) and Willowdale (near Harvey) are now nested in forest that is baited for foxes.

Alcoa's rehabilitation after bauxite mining is aiming to establish self sustaining vegetative communities that have a structure and ecological function as close as possible to the pre-mining state. The ultimate aim of rehabilitation after mining is to allow the rehabilitated sites to be managed in concert with the surrounding forest for all the production, conservation and environmental values that are represented in the jarrah forest. To achieve this requires the rehabilitation effort to address not only the vegetative components but also the wildlife components of the ecosystem.

This investment has resulted in an increase in the trapping success for a number of fauna species including chuditch (*Dasyurus geoffroii*) and quokka (*Setonix brachyurus*) on and adjacent to mine sites. It has also facilitated the re-introduction of the noisy scrub bird (*Atrichornis clamosus*) to the outskirts of the Willowdale minesite. Noisy scrub bird disappeared from the Darling Range soon after European settlement and was thought to be extinct until it was rediscovered 35 years ago at Two Peoples Bay near Albany on the State's south-coast.

Cable Sands (W.A.) Pty Ltd has recently sponsored the program by \$60,000 per annum for three years with an option for an additional two years to enable baiting on 200,000 hectares of National Park along the south coast. This sub-program is known as Coastal Storm.

Cable Sands is conducting mineral sand mining on lands within and adjacent to the D'Entrecasteaux National Park. It is important to Cable Sands to be able to demonstrate that their mining activities are a temporary land use and that rehabilitated areas will be able to merge compatibly with the surrounding land uses when mining is completed. By supporting a wildlife recovery program on a regional scale surrounding their mining activities, Cable Sands will be assured of more rapid wildlife recovery in their localised rehabilitation areas within that greater region.

Petroleum companies WAPET, Woodside and Apache have assisted CALM logistically with fox, cat, rat and mouse eradication on several islands in the Pilbara region. These companies have resources stationed in the region and undertake operations on some of the affected islands.

Coles-Myer, through their Easter Bilby program, have sponsored the capture of wild bilbies to allow a captive breeding program to be established. Negotiations are currently underway with other major corporations to develop further sponsorship arrangements.

The contribution of corporate Australia cannot be understated. As a result of corporate sponsorship, Australian citizens and their future generations can be assured that the native wildlife enjoyed by our grandfathers will again be in abundance for them to enjoy. With respect to sponsorship by the resources sector, not only does it offer a very positive public relations opportunity but it ensures that ecosystem reconstruction after mining operations has a higher probability of success and that completion criteria for rehabilitation can be achieved in the shortest possible time frame.

MEASURING PROGRESS

The ultimate objective of the Western Shield program is not to control foxes and cats but to conserve native wildlife. The measure of the programs success is the degree to which native wildlife recover and that recovery is recognised by their removal from lists of threatened or endangered fauna. To ensure this goal is achieved, the program includes the breeding, translocation and monitoring of native wildlife species to ensure their future conservation. A number of fauna breeding facilities are being established to complement the captive breeding efforts currently being undertaken by the Perth Zoo and private wildlife parks and sanctuaries. The offspring produced from these facilities, in addition to wildlife harvested from areas where secure populations exist, will be re-introduced into areas of their former range now under fox control.

Fauna monitoring is undertaken by CALM operational personnel with the aid of community volunteers, tourist operators, interest groups and school groups. Fauna is monitored regularly over a system of permanent monitoring sites set up across the entire geographic range of Western Shield operations. Monitoring is

undertaken at least once per annum and more regularly for fauna populations that have been recently translocated or that are subject to research studies.

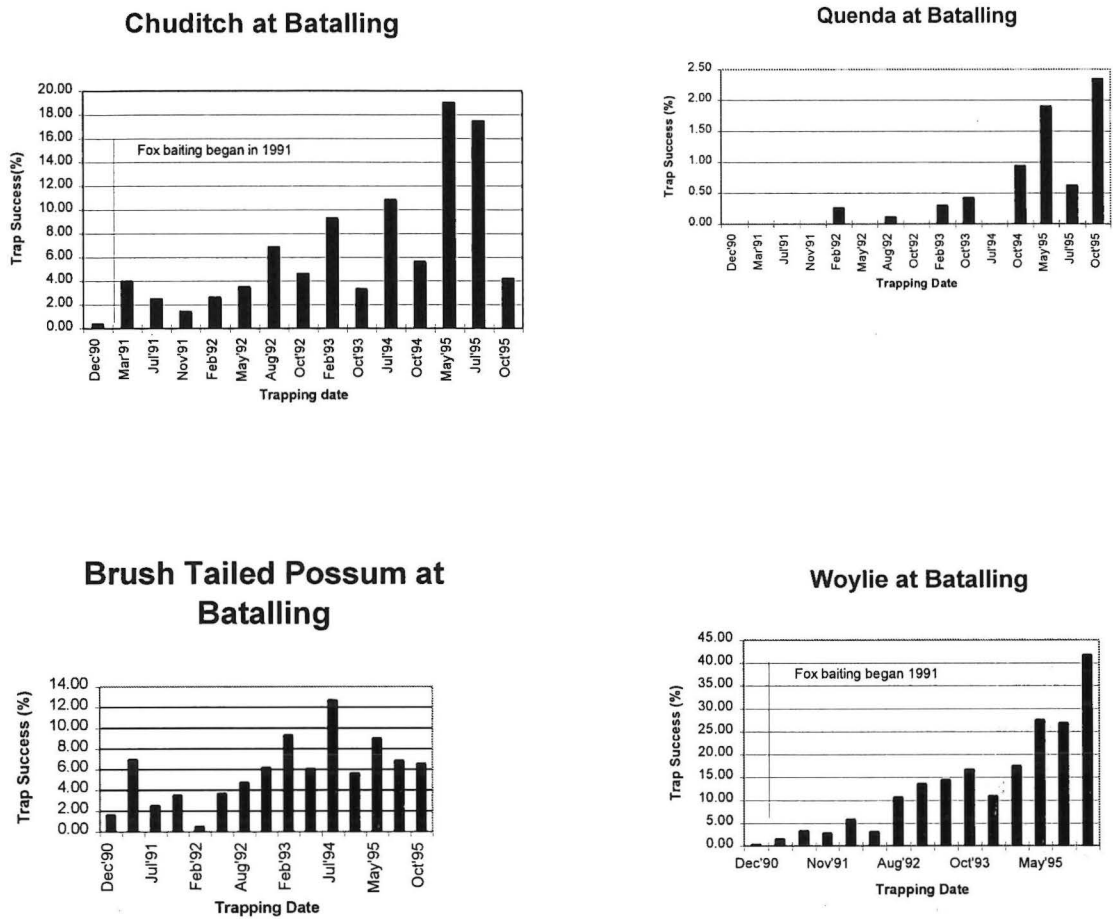
Results of annual wildlife monitoring activities are recorded on a central database that allows annual reports to be made to the senior management of CALM, the controlling body for nature conservation (National Parks and nature Conservation Authority), our Minister (Minister for Environment) and updates on progress to be supplied by newsletter media articles to the public of Western Australia.

CONCLUSION

Control of feral predators has been demonstrated conclusively to be a significant contribution to the conservation of native wildlife in Western Australia. The involvement and support of government, the rural community and corporate Australia has enabled the largest wildlife conservation initiative ever seen in this country to become a reality.

There is an enormous opportunity for the rural and corporate community to become involved in wildlife conservation on private and public lands at a regional scale. A regional approach to wildlife conservation enables localised, temporal perturbations caused by natural processes or land management practices to be ameliorated more quickly. Simple measures such as habitat creation and protection, and the control of feral predators on a regional scale by cooperative community action can meaningfully benefit the conservation of Australia's natural heritage and contribute to farm business diversification and industry sustainability. We can all be winners if we work together.

Figure 1. Wildlife recovery at Batalling Forest as a result of fox control undertaken four times per annum beginning in March 1991



REFERENCES

- Burbidge, Andrew A. and McKenzie, N.L. (1989). Patterns in the modern decline of Western Australia's vertebrate fauna: causes and conservation implications. *Biological Conservation* **50**, 143-198..
- Burbidge, A.A., Friend, J.A. (1990) The disappearing mammals. *Landscape*, **6**(1):28-34
- Christensen, P.E.S. (1980). A sad day for native fauna. *Forest Focus*. **23**:2-12
- Friend, J.A. (1990). The numbat *Myrmecobius fasicatus* (Mymecobiidae): history of decline and potential recovery. *Proc Ecol. Soc. Aust.*, **16**:369-377
- Jarman, P. (1986). The red fox - and exotic, large predator. In the ecology of Exotic Animals and Plants. Some Australian Case Histories. R.L. Kitching (ed), Milton, Qld: John Wiley and Sons
- Kinnear, J.E., Onus, M.L., Bromilow, R.N. (1984). Foxes, feral cats and rock wallabys. *SWANS*, **14**(1):3-8
- Kinnear, J.E., Onus, M.L., Bromilow, R.N. (1988). Fox control and rock wallaby population dynamics. *Aust. Wild. Res.*, **15**:435-450.
- Kinnear, J.E. (1990) Trappings of success. *Landscape*, **5**(2):35-40.
- Kinnear, J.E. (1992) Vexing the vixens. *Landscape*, **7**(4):16-22.
- Long, J.L. (1988). Introduced birds and mammals in Western Australia. Agriculture Protection Board of Western Australia. Technical series 1. Perth: Agriculture Protection Board.
- Maxwell, S., Burbidge, A.A. and Morris, K. (eds) (1996). The 1996 Action Plan for Australian marsupials and monotremes. Prepared by the Australasian Marsupial and Monotreme Specialist Group, IUCN Species Survival Commission. Wildlife Australia, Canberra.
- Morris, K. (1992). return of the chuditch. *Landscape*, **8**(2):10-15.
- Troughton, E. (1957) Furred Animals of Australia. Sydney: Angus and Robertson.

STATUS OF AUSTRALIA'S MARSUPIALS

TOTAL NUMBER OF SPECIES AND
SUBSPECIES = 112

IUCN CATEGORY	No. of taxa
Extinct	16
Extinct in the wild	1
Critically endangered	5
Endangered	17
Vulnerable	31
Lesser concern (conservation dependent)	1
Lesser concern (near threatened)	41

WESTERN AUSTRALIAN MAMMAL SPECIES THAT ARE EXTINCT IN OTHER STATES

Chuditch

Red-tailed Phascogale

Numbat

Western Barred Bandicoot

Boodie

Woylie

Shark Bay Mouse

WESTERN AUSTRALIAN MAMMAL SPECIES THAT REMAIN ONLY ON ISLANDS

(experimental re-introductions of some species are underway)

Western barred bandicoot

Boodie

Banded Hare-wallaby

Shark bay Mouse

Western Australia subspecies of Rufous Hare-wallaby

Greater Stick-nest rat

WESTERN AUSTRALIA MAMMALS SPECIES THAT HAVE DISAPPEARED FROM THE SOUTH WEST BUT REMAIN ON THE MAINLAND FURTHER NORTH

Bilby

WESTERN AUSTRALIA MAINLAND MAMMALS THREATENED BY FOX PREDATION

Chuditch
Dibbler
Red-tailed Phascogale
Mulgara
Numbat
Northern Marsupial Mole
Southern Marsupial Mole
Quenda
Bilby
Woylie
Gilbert's Potoroo
Tammar Wallaby
Spectacled hare-wallaby
Black-flanked Rock-wallaby
Western Brush Wallaby
Quokka
Western Ringtail Possum
Brush Possum
Heath Rat
Pale Field-rat
Water Rat

OTHER SPECIES THREATENED BY FOX PREDATION

Large pythons (Woma, Pilbara Olive Python, Carpet Python)
Large Ground nesting birds (eg Bush Stone-curlew, Malleefowl)
Western Ground Parrot
Western Swamp Tortoise

+ probably many others we don't know about yet.